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1963

DEPARTMENT OF FISHERIES

CANADA

Being the Ninety-Seventh Annual Fisheries Report of the Government of Canada

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1964

To His Excellency Major-General Georges P. Vanier, D.S.O., M.C., C.D., Governor General and Commander-in-Chief of Canada

May it Please Your Excellency:

I have the honour herewith, for the information of Your Excellency and the Parliament of Canada, to present the Annual Report of the Department of Fisheries for the year 1963, and the financial statement of the Department for the fiscal year 1963-64.

Respectfully submitted,

Minister of Fisheries.

To the Honourable H. J. Robichaud, M.P.,
Minister of Fisheries,
Ottawa, Canada.

Sir:

I submit herewith the Annual Report of the Department of Fisheries for the year 1963, and the financial statements of the Department for the fiscal year 1963-1964.

I have the honour to be, Sir,

Your obedient servant

Deputy Minister.

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APPENDICES

George R. Clark

The Department of Fisheries of Canada suffered a severe loss on February 12, 1963 in the sudden death in Tokyo of its Deputy Minister, George R. Clark, at the age of 54.

Mr. Clark, who was in Japan as head of the Canadian delegation at a meeting of the International North Pacific Fisheries Commission, of which he was chairman, succumbed to a heart seizure.

At the time of his death he was chairman not only of the North Pacific Commission, but of the International Commission for the Northwest Atlantic Fisheries and the International Whaling Commission. He was also vice-chairman of the North Pacific Fur Seal Commission and had served as chairman of the International Pacific Halibut Commission, the International Pacific Salmon Fisheries Commission and the Great Lakes Fishery Commission. In Canada, he was chairman of both the Federal-Provincial Atlantic Fisheries Committee and the Federal-Provincial Committee for Ontario Fisheries.

Before he joined the Department of Fisheries as Director of Western and Inland Fisheries in 1948, Mr. Clark had been associated with the fishing industry in British Columbia for nearly twenty years, and had served in executive capacities with the British Columbia Salt Fish Board and the Salmon Canners' Operating Committee. During the war he was liaison officer with the Mobilization Board for British Columbia on behalf of the fishing industry of that province. Immediately before joining the Department, he was manager of personnel and industrial relations for the Canadian Fishing Company, Ltd., in Vancouver.

In April, 1950, Mr. Clark was appointed Assistant Deputy Minister, and Deputy Minister in December, 1954. On the national fisheries scene, he did much to bring about a better understanding of fisheries, and was largely responsible for bringing together governmental and industrial fisheries agencies across Canada, so that a co-ordinated program for the betterment of the fisheries generally could be implemented.

Mr. Clark was succeeded as Deputy Minister by Dr. A. W. H. Needler, who moved to Ottawa from his post as Director, Fisheries Research Board of Canada, Biological Station, Nanaimo, B.C.

INTRODUCTION

EACH YEAR Canada's commercial fishermen take an increasing catch from the Atlantic and Pacific Oceans and from great inland fishing areas to meet domestic and foreign needs for protein food. The per capita consumption within the country is relatively low; sixty-eight per cent of the 1963 production was exported, making Canada one of the world's leading providers of fishery products.

"Fish", under the Fisheries Act, includes shellfish, crustaceans and sea mammals, as well as the true fishes, and the Department's involvement with all species is dealt with in this report. The 1963 landings of all species amounted to more than one million, one hundred and twenty-five thousand tons, worth close ot $129 million to the primary industry and about $255 million marketed. (See "The Fishing Industry", page 23, for details.)

In addition sports fishermen, in numbers which have increased spectacularly in the past few years, have taken huge quantities of fish from fresh and tidal waters. The size of the catch in the sport fishery is difficult to assess, for obvious reasons, but it has become an important factor to be considered in the management of the fisheries resource.

Stocks of all fish are vulnerable to exploitation, no matter how inexhaustible they may seem, and certain species which are in heavy demand are being fished, in international waters, by many nations. Fishing fleets are becoming exceedingly efficient in locating fish and catching techniques are undergoing constant improvement. The pressures in some areas of the high seas are so great that international commissions have been established to conserve stocks while allowing the maximum possible exploitation. A chapter of this report deals with Canada's participation in the work of these commissions. Other factors affect the marine and freshwater fisheries, of course, such as man-made changes in and around fishing grounds and spawning streams, and these have created a need for intensive scientific research and the applications of the findings reached.

The federal Government, under the British North America Act, has legislative jurisdiction in coastal and inland fisheries. By agreement, some of the provinces have accepted, to a greater or lesser degree, the administration of the fisheries within their boundaries. The province of Quebec is the only one to administer all its fisheries, both freshwater and marine but fish inspection in Quebec is a federal responsibility. The provinces of Ontario, Manitoba, Saskatchewan and Alberta assume responsibility for the freshwater species, but in areas such as Hudson Bay and James Bay the federal Government deals with all marine problems. In British Columbia the Government of Canada is responsible for marine and anadromous fish and the province has charge of the purely freshwater species. In Nova Scotia, New Brunswick, Newfoundland, Prince Edward Island and the Northwest Territories the federal Government exercises complete administrative as well as legislative control of all species, both marine and freshwater.

The Department, from its Ottawa headquarters, directs its operations through regional headquarters for the Pacific, Central, Quebec, Maritimes and Newfound-

land Areas. These area offices are in Vancouver, Winnipeg, Quebec, Halifax and St. John's. The working force in the field is made up of Protection Officers ashore and afloat, Inspection Officers, biologists, engineers and technicians and specialized employees doing economic research, instructional and informational work, consumer education and industrial research and experimentation.

This report also covers the operations of the Fisheries Prices Support Board, the Fishermen's Indemnity Plan and the Fisheries Research Board of Canada. The Prices Support Board and the Research Board issue separate Annual Reports covering their activities in greater detail.

British Columbia cannery worker holding a 73-pound spring salmon.

CONSERVATION AND DEVELOPMENT SERVICE

CONTINUITY in conservation and developmental projects for the fisheries of Canada can be achieved only by the anticipation of new problems and careful advance planning. This calls for a joint program in which this Service's two branches, Fish Culture and Protection, must completely blend technical and administrative skills to meet present and foreseeable emergencies. The brief summary in this chapter outlines the accomplishments of 1963 and the results hoped for in the future.

In British Columbia, the engineering and biological work of the Fish Culture Development Branch continued to expand during the year even though only minor staff changes were made. The two main functions of the Branch are to devise facilities to protect the fisheries resource from the effects of industrial and other water-use projects, to expand it by the use of techniques developed through research and to assist with the management of the salmon fishery. There was increased activity in each of these fields.

The expanding economy and favourable conditions for export gave rise to pulp mill expansion programs as well as to plans for a number of new mills. Some of the proposed mills are, for the first time, to be located in the interior of the province on salmon producing streams. They could create critical pollution problems. In addition, there has been an increase in logging effort which has required constant vigilance and ingenuity to ensure protection of salmon spawning and rearing areas.

Mining has also benefited from the favourable economic conditions and many proposals for new mines as well as for reactivating old ones have been studied. Pollution studies have therefore become one of the main activities of the Branch in the field of protection of the fisheries resource.

On the Atlantic coast, the scope of the work of the Fish Culture Development Branch could conceivably include all species of our fisheries and could aspire to stabilize or increase the populations of all species involved. In present practice, however, the work is limited to valuable anadromous and resident species of fish and to valuable species of bivalve shellfish. Because they live in semi-enclosed environments—the rivers, lakes and estuaries for all or for a considerable portion of their lives—these species offer the best chance of management of their own numbers and of their environments. For the same reason, these species are particularly susceptible to deleterious changes, usually man-made, in the environment. These last two statements really define the two main tasks of fish culture: defense of the environment, and the fish in it, and development of the environment, and again, axiomatically, of the fish in it. These tasks are not always easily separable and both must go on concurrently.

The Protection Branch of the Service has had to meet the challenge imposed by the increasing size and efficiency of the fishing fleets and improved techniques both off the coasts and on inland waters, as well as the continuing rapid expansion of the sport fishery and the age-old problem caused by the activities of people who flout regulations and resist educational as well as coercive methods of

reducing their depredations. The Branch has met this challenge by increasing the mobility and versatility of its units and by indoctrinating its officers in administrative and enforcement practices which have proved successful in the past.

PACIFIC AREA

Management of the salmon fisheries is a major concern of the Department of Fisheries in the Pacific Area and, except for the sockeye and pink salmon of the Fraser and Skeena Rivers, it is a responsibility of the Protection Branch. To carry out the broad range of activities involved in regulation and management of the fisheries, the Protection Branch has a complement of 378 men, 235 of whom are full-time employees; the remainder are hired on a seasonal basis. The Protection Branch is essentially a field force, operating along the heavily fished coastline, in interior regions where salmon rivers find their origin, and in the Yukon Territory where the fishery resource, particularly from a sport standpoint, grows in importance.

The Fisheries

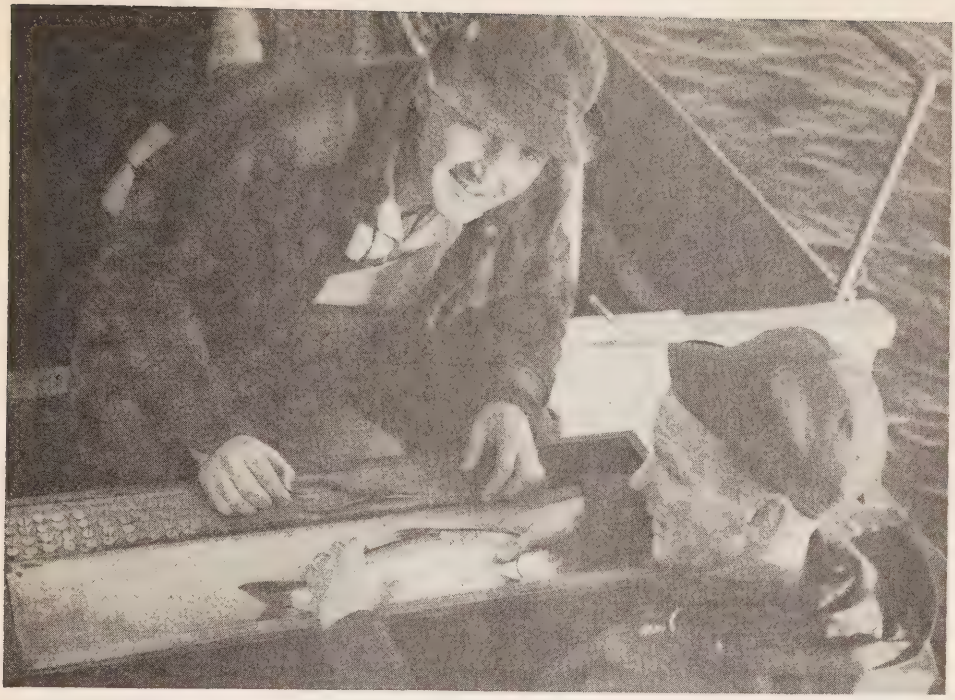
Landings of salmon in 1963 totalled 19,990,000 fish, somewhat below average, compared to 32,792,000 in 1962 and 18,091,000 in 1961. Although not taken in the record numbers of 1962, pinks continued dominant in landings and composed half of 1963 total salmon catch. Landings of sockeye declined from 3,500,000 in 1962 to less than 2,086,000 fish in 1963. Good runs returned to both the Rivers and Smith Inlet area and the Fraser River. However, the sockeye catch to these areas was less. In the Skeena and Nass Rivers, returns were also less than expected.

The pink salmon catch of 12,200,000 pieces, while half the record catch of 1962, was considerably greater than the 8,300,000 fish caught in the cycle year 1961. In District 2, the central areas again produced at a high level. In District 1, runs to the Fraser River and adjacent areas also produced well with a catch of 3,940,000 compared with 465,000 in the present year.

The return of chum salmon along the British Columbia coast was again light although showing some signs of rehabilitation in the north coast area. In District 2, the catch of 1,067,000 showed a marked improvement over that of the cycle year. The improved runs were also reflected in a moderately good escapement in these areas, especially to the east coast of the Queen Charlotte Islands where heavy spawning stocks were obtained for the fourth consecutive year. In District 3 and District 1, the catch of 403,000 and 53,800 respectively was the lowest on record.

There was a good run of coho salmon with a total catch of 3,422,000 pieces. This species has returned in near record numbers for the last three years. Both District 2 and the west coast of Vancouver Island produced well, especially in the troll fishery. In the Gulf of Georgia, an important coho producer, the catch was poor.

Although spring salmon catches were somewhat better than in 1962, they were below the long-term average. This was reflected in average escapements which occurred at most points along the coast.



Tagging Coho salmon grilse aboard a purse seiner during the 1963-64 Georgia Strait winter tagging program.

Regulatory measures involving shortened fishing weeks and partial or complete closure of fishing areas were again stringent in the chum fisheries, especially in the Fraser River.

In 1963, 578 whales were taken by the fleet of five whale catcher boats operating from the Whaling Plan situated on the north end of Vancouver Island. The catch was somewhat less than anticipated, 135 less than in 1962. Some meat was frozen for human consumption and shipped direct to the Orient. For the first time, Russian and Japanese whale catchers were observed off the British Columbia coast. Enforcement of territorial rights was ensured by continuous surveillance of the international fleet by air and surface craft patrols.

Fishery Officers issued 21,208 commercial fishing licenses during the year as well as 2103 Indian fishing permits. In addition, 939 angling permits were issued for sports fishing in tidal areas, where such permits are required by regulation, i.e., Rivers Inlet, Phillips Arm and Muchalat Inlet.

Tidal sports fisheries, especially for salmon, continue to grow in importance and two Fishery Officers are now employed full-time in this fishery. In 1963, a total of 393,000 salmon was landed by sport fishermen. While coho and spring salmon normally make up the bulk of the sport catch, in 1963, 111,000 pink salmon were taken from the good supplies of this species entering Georgia Strait from Juan de Fuca and Johnstone Straits. In the Victoria and Howe Sound areas, sports fishermen landed outstanding catches of this species.

During the year there were 363 prosecutions for violations of the various acts and regulations. Revenue amounted to $16,090 from fines and $7,484 from

the sale of confiscated articles and fish. Other duties of Fishery Officers included predator control, stream clearance work and fry salvage. Departmental personnel destroyed 334 hair seals and 188 sea lions in 1963. Approximately 180,400 salmon fry were salvaged through efforts of Fishery Officers chiefly along the lower east coast of Vancouver Island. Reduced need existed for fry salvage operations as a result of the cool, wet summer.

A control program on sea lions was again carried out in 1963 on haul-outs near commercial fishing areas where damage to fish and gear had previously been reported as serious. A total of 349 sea lions was killed. Fishermen report that the program has obtained the desired effect and that damage to fish and gear in 1963 was at a minimum; therefore, it will be discontinued in 1964 and replaced by a thorough aerial census of the total sea lion population on the British Columbia coast.

Fishery Officers assigned to the Yukon Territory were again active in 1963. Commercial export quotas on the 32 lakes permitted a total catch of 223,000 pounds of whitefish and lake trout. The officers, in addition to other duties, issued 7218 licenses during the year, 7180 of them being angling licenses issued to sports fishermen.

Communications

The number of departmental vessels on patrol duty in the Pacific Area was increased to 38. The 36-foot fiberglas launch, FPL *Thrasher Rock,* was built and went into operation replacing *F.D. 201.* The 95-foot steel patrol vessel *Hunter Point* was completed late in the summer. This vessel has a top speed of 18 knots and carries the latest electronic navigational aids.

The policy of equipping Fishery Officers and patrol vessels with small, fast speedboats was continued in 1963. Efforts were also continued to increase the efficiency of the Department's coastwise radio-telephone network by replacing obsolete units in a number of patrol boats and office-residences. Improved fish-finding equipment was installed in a number of vessels employed in the management of the herring stock.

The number of motor vehicles operated by the Protection Branch increased to 32. Replacement vehicles were purchased for four sub-districts in British Columbia. The number of office-residences operated by the Department remained at 18.

Fish Culture Development

In the development field, projects started in previous years were rapidly nearing completion and new projects were being studied in order to ensure continuance of an orderly program of development. The Big Qualicum Project, which had been delayed by difficulties with a transmission line adjacent to the reservoir, was finally put into full operation near the end of the year and was expected to commence to yield results from that time forward. New projects are being explored in the Babine Lake area to increase sockeye production, and on the Tsolum River to increase pink salmon. Completed spawning channel projects at Jones and Robertson Creeks are continuing to yield good results, thus encouraging the continuation of this type of project.

During 1963, the salmon management program by the Branch was extended beyond analysis of the Johnstone Strait commercial fishery, the Fraser River Chum Salmon Investigation and the Owikeno Lake sockeye studies. It now includes a study on the Strait of Georgia coho and chinook salmon stocks; participation in an international Coho and Chinook Salmon Committee; escapement enumeration of the Smith Inlet sockeye and Cheakamus River pink and chum salmon stocks; test-fish sampling of the Nass River sockeye salmon populations. Furthermore, broader participation has been realized with the Protection Branch in the management of the commercial and sports fisheries.

Robertson Creek Experimental and Development Project

The Robertson Creek spawning channel and its facilities were designed and constructed by the Department to serve as a production and experimental area for Pacific salmon. Major construction was completed more than two years ago and since that time a full program, involving major transplants of pink salmon eggs, studies of the rearing requirements of juvenile coho salmon, assessment of the use of an artificial spawning channel by pink, coho, and chinook salmon, and research on a louver installation for guiding juvenile salmon, has been underway.

The 1963 pink salmon return from the 1961 transplant of 4.6 million eggs was approximately 4900 fish, of which nearly 4200 spawned in the channel; approximately 500 spawned elsewhere in the Somass River system, while an estimated 200 were caught in the tidal sport fishery. This return is encouraging because the fry-to-adult rate of survival was ten times that recorded with the relatively small 1959 transplant, and three times that with the small 1960 transplant. The largest transplant to date, 9.6 million eggs, was placed in the channel to augment the calculated 3 million eggs deposited by the 1963 adult return.

The coho rearing experiments which have been underway at Robertson Creek since 1961 have shown that, while the riffles produce most of the food which sustain juvenile coho salmon, the pool-like sections produce more fish. In 1963, therefore, studies were initiated to compare the smolt production from a combined pool-and-riffle channel, a pool-like channel and a swift riffle-like channel.

Big Qualicum River Project

The 1962-63 egg-to-fry survival for chum salmon was measured at 9.4 per cent, which is between maximum and minimum survival values obtained in the four years of pre-development studies. Intermediate survival values were also obtained for coho and chinook salmon. The survival was reduced because of a high discharge of short duration resulting from the break-up of log and brush debris at the outlet of Horne Lake.

The 1963 spawning escapements for the individual species were as follows: 4204 chum; 1348 coho; and 648 chinook salmon. The chum salmon escapement was slightly above average and the chinook escapement was the lowest recorded since commencement of the study. The coho count was representative of only a part of the escapement as some coho migrated when the fence was inoperative because of high flows.

Completion of the Horne Lake storage dam and the high-level intake was deferred to the summer of 1964 because relocation of the B.C. Hydro transmission line was not completed until November 15. After that date, the Horne

Lake reservoir was drawn down to provide storage for floods during the winter, and this proved to be effective during heavy runoff in December. It is expected, as a result of this flood control, that the egg-to-fry survival rate will exceed any of those recorded in the previous five years.

Counting salmon fry from Big Qualicum River, B.C.

Approximately 6 million pink salmon eggs which were eyed in a newly constructed hatchery building at Big Qualicum were planted in the upper sections

of a 2400-foot spawning channel which was constructed in 1963. Native chum and coho spawning stocks spawned in the remainder of the channel.

Biological studies of the Big Qualicum salmon stocks were continued in 1963 in order to obtain additional data from which future comparisons will determine the benefits of the development project.

Spawning channel 2400 feet long and 20 feet wide, constructed adjacent to Big Qualicum River, B.C., in 1963.

Multiple Water-Use Projects

Through liaison with the provincial Government, all water license and placer-mining applications were reviewed for possible fisheries problems before licenses were issued. In 1963, approximately 1300 water license applications and 75 placer-mining applications were reviewed. While many were approved outright, some were made subject to provisions inserted to protect the fisheries resource. Others were opposed unconditionally as not being compatible with the fisheries resource.

Logging

In the Prince Rupert and Vancouver Forest Districts, all pending timber sales which border upon or include any portion of salmon-producing streams were referred to the Department and individually assessed by Departmental field personnel. The appropriate stream protection clause(s) were subsequently inserted by the British Columbia Forest Service into the contract with the logging operator. In addition, a number of biennial Tree Farm License Cutting Permits were similarly processed.

Nanika-Bulkley River System

The Nanika River hatchery, constructed by the Department to restore the Nanika sockeye run, which had severely declined in the years after 1953, is now in its third year of production.

The 7.6 million fry released to the river in the spring of 1963 migrated directly to Morice Lake, and subsequent samplings in the lake indicate that there has been a good rate of survival.

This year, unusually high losses were incurred in the transfer of the 12.8 million eggs from the donor stream to the hatchery. Subsequent losses, however, have been minimal and it is expected that at least 7 million fry will be released into the river in the spring of 1964.

A major biological program is being carried out to assess the contribution of the hatchery and to determine whether expected increases in the level of the sockeye stock result from the hatchery transplants or from natural increases in the native stocks.

The pink salmon run to the Bulkley River has increased significantly each year since the removal of the obstruction at Hagwilget Canyon. Before the obstruction was removed, only a few hundred pinks spawned in the lower part of the river. Two years ago, several thousand moved well up into the river and spawned. This year, 35,000 pinks were recorded well distributed throughout many miles of under-utilized spawning area in the river system.

Investigations and Assessments (Development)

In 1963, the Department continued its comprehensive program of investigations and assessments of salmon streams to determine the efficiency of measures taken to date, what further improvements might be effected, and the maximum salmon potential of the individual systems.

The Babine Lake development surveys were continued in 1963 to determine the feasibility of providing a substantial increase to the number of sockeye fry entering the main basin of Babine Lake. The results of these surveys have shown that the Fulton River, 15-Mile Creek, Morrison River and Grizzly Creek offer the best potential for development. Preliminary layouts for spawning channels on both 15-Mile Creek and Fulton River have been made and preliminary costs estimated. More detailed studies on these streams are now being planned.

A study of the Tsolum River, tributary to the Puntledge River, was continued in 1963 to determine the feasibility of transforming Wolf Lake into a storage reservoir from which water releases can be made during the low-flow period to facilitate the migration and spawning of an important run of pink salmon.

The stream inventory program initiated in 1961 to assess existing and potential salmon-supporting streams was continued in 1963. Comprehensive programs of basic data collection have been implemented at Yakoun, Ain, Deena and Pallant Rivers and Mathers Creek on Queen Charlotte Islands. These were selected in 1962 for detailed study to determine the feasibility of undertaking stream improvement measures.

Marine Seismic Explorations

From mid-April to mid-August, a marine seismic exploration was carried out by Shell Oil Company of Canada. Both gas-exploder and conventional

seismic techniques involving Nitramon charges ranging from 5 to 300 pounds in weight were employed in offshore waters ranging in depth from 6 to 600 fathoms and extending from Barkley Sound northerly to north-central Hecate Strait. Preliminary technical meetings resulted in acceptance by the company of a number of conditions designed to afford maximum protection to the fishery and adequate supervision of the operation. Observed damage to the fishery resource was considered light.

Puntledge River Power Development

On April 16, 1963, the B. C. Hydro and Power Authority inaugurated a temporary program on the Puntledge River whereby the powerhouse was closed down at night during the period when chinook salmon fry were migrating downstream, and during the daylight hours in the period when the adults were migrating upstream to spawn. The powerhouse was closed down completely in the months of June and July when the upstream and downstream migrations overlapped.

An assessment of the effectiveness of this program has disclosed that while powerhouse closures constitute a solution for the adults attracted to the tailrace of the powerhouse, they cannot be regarded as suitable for the downstream migrants because the larger downriver stocks of salmon are exposed to serious losses as a result of stranding caused by fluctuating flows. The 1963 studies indicate that plant closures would be an acceptable solution to the adult problem but that fish-protective facilities would be required for the downstream migrants.

Fraser River Board

The Fraser River Board's Final Report on flood control and hydro-electric power, which was completed in 1963, recommends a system of dams in the headwaters of the Fraser River System and improvement of existing dykes in the Lower Fraser Valley to provide protection against floods of considerably greater magnitude than that of 1948.

The system of dams, known as System E, suggests eight damsites—five on the Clearwater River, one on the Cariboo River (a branch of the Quesnel River), one on the Fraser River upstream from Prince George, and one on the McGregor River. The latter would involve diversion of flows to the Peace River.

Fish facilities have been designed to protect the runs of chinook salmon which would be affected if the dams were constructed. Moreover, river discharges and water temperatures have been specified in the report for various locations throughout the Fraser system in order to maintain a normal environment for the salmon.

The first and most urgent recommendation of the Board is that the present dyking system in the Lower Fraser Valley be improved to withstand a flood of the magnitude which occurred in 1948. This would give immediate and substantial improvement in flood protection without interfering with the fishery.

Pollution

Water pollution control continued to be a major source of concern to the Department in 1963.

Several pulp mills located on tidewater expanded production in 1963, necessitating a re-assessment of existing effluent disposal facilities. With the advent of proposals to build pulp mills on the Fraser, Thompson and Morice Rivers, it has been necessary to conduct detailed investigations relating to the assessment of toxicity of kraft mill effluent and available means of treatment which would enable these wastes to be discharged in a condition harmless to fish. Substantial information has been acquired and progress has been made with the companies in developing acceptable means of effluent disposal.

Several proposals involving the mining and concentrating of silver and copper ores have been examined by the technical staff during the course of the year. These proposals have been discussed with the companies involved relative to the provision of facilities to minimize danger to fish which could result from the discharge of tailings, silt and toxic chemicals used in the concentrating processes.

The provision of facilities was agreed upon for the disposal of wastes from a chlorine and caustic soda manufacturing plant and from an electroplating plant.

Studies in the field and in the laboratory were carried out to select insecticides less toxic to fish than DDT. Phosphamidon and Baytex appear to be promising alternatives for forest insect and mosquito control programs. It was necessary also to review an increasing number of proposals relating to the use of pesticides for control of ambrosia beetles, biting mosquitoes and flies, snails acting as carriers of swimmer's itch and marine borers.

A number of proposals involving the discharge of domestic sewage were reviewed and, where necessary, measures were taken to protect the fisheries resource.

Fraser River Chum Salmon Investigation

The fourth year a biological investigation of the Fraser River chum salmon stocks was completed in 1963. The major purpose of this study was to obtain the additional information required for technical management and rehabilitation of the Fraser River chum salmon stock. The study consisted of several major segments:

(1) tag and recovery type spawning enumeration programs have been conducted on each of the major tributary spawning areas;

(2) test-fishing by commercial gillnet is conducted annually to provide an index of daily abundance of chum salmon in the river. This technique now constitutes a basic regulatory tool for the management of the Fraser River net fishery;

(3) tagging at the mouth of the river and at the upper limits of the commercial fishing area is carried out to further define migration timing and to enumerate the total system escapement;

(4) a downstream migrant enumeration study in co-operation with the International Pacific Salmon Fisheries Commission has been developed at Mission on the Fraser River to provide an index of annual fry production. The results from this study are now providing an accurate measure of chum salmon fry production and will serve as a basis for the prediction of future adult returns.

The most important finding of the studies to date is that a large mainstem spawning population of chum salmon exists. These stocks, now in a depressed state, contributed to the Fraser River and Johnstone Strait fisheries. As a result

of information acquired on the timing, speed of migration and escapement size of the various stocks of Fraser River chum salmon, a rehabilitation program based on regulation of the fishery has been developed. This is now providing specific protection for these stocks both in the Fraser River and Johnstone Strait.

Strait of Georgia Chinook and Coho Salmon Investigation

The Strait of Georgia represents the major tidal sport fishing area of British Columbia and also supports a valuable commercial troll fishery. The sport fishery harvests an approximate annual catch of 120,000 coho and 60,000 chinook salmon in addition to a catch of 100,000 grilse. The average annual commercial catch of coho and chinook salmon exceeds 300,000 and 100,000 pieces respectively.

In 1963, a biological study was implemented to acquire information upon which to develop future regulation of the fisheries. An analysis has been made of the extensive catch data available for the area and, from this, an up-to-date assessment of the catch trends and the effects of both the sport and commercial fisheries on the stocks in the Strait of Georgia, Victoria-Saanich and Juan de Fuca area has been obtained. The 1963 field studies included two tagging studies designed primarily to study the migration and exploitation of the grilse and blueback stage of coho salmon. During May and June, a total of 1250 immature coho and chinook salmon were tagged in the Strait of Georgia and in the subsequent December-January period, 2000 coho grilse were tagged in the extreme southern and northern portions of the strait.

Particular note should again be made of the excellent co-operation which the the engineering and biological staff received from other technical groups and agencies. These included the Fisheries Research Board of Canada, International Pacific Salmon Fisheries Commission, Fish and Game Branch of the British Columbia Department of Recreation and Conservation and various other agencies in Canada and the United States.

CENTRAL AREA

The Conservation and Development Service is charged with the management of the fisheries in the Northwest Territories. To carry out its program the Department maintains a permanent staff of five fishery officers and two seasonal guardians. In addition to enforcing regulations, these Protection Officers gather statistical data for the Economics Service, do a considerable amount of educational work with fishermen, plant workers and secondary producers and provide valuable information to other services of the Department and to outside agencies interested in the orderly development of the commercial, domestic and sports fisheries of the Northwest Territories.

In 1963, the Protection Branch used two patrol vessels, one 18-foot fiberglas cruiser, three bombardier snowmobiles, and chartered aircraft to patrol the fisheries which now extend as far north as the Arctic Ocean. A new patrol vessel, the M/V *Rae Point,* which replaced the M/V *Mareca,* was commissioned on Great Slave Lake last August. She is 38 feet long, of fiberglas construction and diesel powered.

Four companies employing 450 fishermen operated on no less than 17 lakes, including Great Slave, during the year. Landings from Great Slave were down by 700,000 pounds from the previous year. The decrease was due mainly to two factors: (1) fishermen were prevented from setting nets any distance from shore at the beginning of the winter season because of poor ice conditions; (2) as an after effect of the disastrous flood which hit the town of Hay River in May, the summer season was late in getting under way.

Catches from the Expansion Program lakes reached 669,910 pounds. This was somewhat short of expectations but it was a boost to the economy of the Territories. A late freeze-up and a very depressed market were the contributing factors controlling this production.

The total catch for the calendar year 1963 from Great Slave Lake was 5,555,766 pounds, made up as follows: whitefish 4,281,360; lake trout 683,280; inconnu 321,692; pike 255,581 and pickerel 13,853.

Prices received by the fishermen F. O. B. Hay River for Great Slave Lake fish were: whitefish 14 cents; trout 18 cents; inconnu 8 and pike 5 cents. Returns to the companies F. O. B. Edmonton were 23 cents; 30 cents; 18 cents and 12 cents for whitefish, trout, inconnu, and pike respectively.

During the year there were 18 infractions of the Fisheries Regulations, half of which were committed by persons unknown. A total of $205 was collected in fines and 114 gill nets were confiscated.

Most of the domestic fishery takes place during the fall at which time the Indians, Eskimos, R. C. M. P. and religious groups participate. From all reports and observations, the operation was satisfactory although catches were down considerably from last year.

Sports Fishery

Anglers enjoy about ten to twelve weeks of fishing for lake trout, arctic char, grayling and northern pike in the Northwest Territories. This fishery usually begins in early June and is over by late August or early September, depending upon weather conditions.

The demand for angling licenses continues to increase each year and 1963 was no exception. A total of 1624 licenses were sold compared to 1400 the previous season. Over 70 per cent of all licenses are purchased by non-residents of the Northwest Territories.

A new fishing lodge with facilities to accommodate 52 guests was opened during the summer at Cameron Bay on Great Bear Lake. There are now three lodges at Great Bear and two on Great Slave.

Although lake trout is still the species most sought after by the sports fisherman arctic char is attracting more and more anglers each year. The increased interest in char fishing is exemplified by activities at Tree River, a river which empties into the Arctic Ocean, approximately 80 miles east of Coppermine. During July and August between 20 and 30 fishermen per day fished this small river system for char.

The anglers reported a good season with an abundance of all species. Lodge operators also had a successful year and were booked to capacity for the entire season.

Beluga Fishery

Beluga operations at Churchill, Manitoba, were resumed this year by Churchill Whale Products Limited who took over the business formerly owned and operated by Adanac Whale and Fish Products. The hunting started during the week of July 14 and ended August 31. A total of 160 beluga (110 males, 50 females) were captured during the hunting season. Thirteen hunters took part in the fishery. The beluga were caught in the Churchill River and averaged 9.7 feet in length.

There is also beluga hunting by community effort for food under the sponsorship of the Department of Northern Affairs and National Resources in the vicinity of Whale Cove farther up the western shore of Hudson Bay and in the Mackenzie Delta area.

MARITIMES AREA

Due to a cold winter with a heavy snowfall, especially in New Brunswick and Prince Edward Island, the spring season was late and heavy drift-ice curtailed fishing operations in eastern Nova Scotia and the Gulf area. In late May, conditions improved and the summer and fall months were exceptionally fine and warm. Cold weather set in early in December and from then until the end of the year, it was bitterly cold. One of the worst blizzards in recent years occurred on December 19 and caused excessive damage to fishing installations and wharves. The hardest hit areas were the coasts of Inverness, Antigonish and Pictou Counties in Nova Scotia, and Kings County in P.E.I. During the year, two other heavy gales occurred in the Maritimes Area—one on February 20 and Hurricane "Ginny" on October 29.

Throughout the entire season, water levels in New Brunswick were at normal to above-normal levels, but were low in Nova Scotia during the summer and early fall months. In October, heavy rains occurred in Nova Scotia and water conditions returned to normal levels. Thus, good spawning conditions prevailed in all Maritime water systems.

Commercial Fishing

Preliminary figures indicate the year 1963 produced record earnings for the fishermen of the Maritimes Area. There was a substantial increase in the over-all landings and practically all species brought greater returns to the fishermen concerned.

The most noteworthy increases occurred in the landed value of scallops, lobsters, swordfish, haddock and flatfishes. In all, Maritime fishermen earned about 4½ million dollars more than the previous year.

The scallop fishery continued its upward trend due to the heavier fishing effort and the exploitation of a new bed off the western end of Nova Scotia.

A new method of catching swordfish by baited longlines commenced late in 1962. This year, practically three-quarters of the fish were taken by this method and good catches were taken from the month of June right through until December. In former years, the old method of taking swordfish with harpoons lasted only about three months—July, August and September. This year the catch was up nearly nine million pounds and one million dollars in landed value. There were

also heavier landings and greater returns to the fishermen who engaged in the herring, mackerel, alewives and oyster fisheries.

The 1962 sealing season was 5 days shorter by regulation and 66,217 seals were taken, some 9900 less than in 1962. Landed value was, however, greater. Nine ships, four helicopters and 20 airplanes took part in the fishery.

Bounty payments in the amount of $3685 were made to persons who submitted jaw bones as evidence for the destruction of harbour and grey seals. The bounty rate is $10 for an adult and $5 for each pup. Payments covered 146 adult seals and 445 pups.

Sports Fishery

Inland water conditions were good in New Brunswick, fair in Prince Edward Island, and poor in Nova Scotia. The catch of 73,071 salmon taken by anglers in the Province of New Brunswick was the best on record. The Miramichi system alone produced 58,182 fish, while the Restigouche and Saint John Rivers gave up excellent catches. This great run was about 90 per cent grilse and, as a result, the commercial fishermen did not share in it. The rod and line catch of salmon in Nova Scotia amounted to only 3086 fish, about 61 per cent of the 1962 total. The St. Mary's, Medway and Margaree gave the best results. In Prince Edward Island, the best salmon angling river was the Morell, which produced 52 fish.

Making a sample count of young salmon by electrofishing in Margaree River, Nova Scotia, August 1963.

Trout fishermen had a good season in Nova Scotia but, due to the cold late spring season in New Brunswick and Prince Edward Island, trout catches were only fair. Catches of other species such as black bass, striped bass, pickerel, brown trout, grey trout and sebago salmon were normal.

Salt water anglers enjoyed a good year. Fifty-six boats in Nova Scotia were engaged in the business and their owners are finding this a profitable enterprise. One hundred and fourteen bluefin tuna were boated, the largest weighing 832 lb. Salt water anglers also took excellent catches of pollock and cod.

Prosecutions

During the year, Protection Officers carried out 553 prosecutions. Twenty-three cases were dismissed, withdrawn or lost, and 18 persons went to jail. Fines collected amounted to $10,873.98.

Licenses

A total of 40,477 licenses and permits were issued in the Maritimes Area during the year. Over 29,000 were revenue licenses, 23,536 for lobster fishing and over 10,000 were non-revenue permits.

Patrol Boats

A fleet of 28 patrol vessels operated during the year. Twelve were employed the year round and the remainder on a seasonal basis. Total miles logged amounted to approximately 184,000. The largest vessel, *Cygnus,* was chiefly engaged in offshore patrol. In the course of duty, this vessel identified and checked 821 Canadian trawlers and draggers, 15 Russian supply ships, 26 Russian trawlers, 1 Japanese trawler and 8 United States draggers.

Loss of Boats and Gear

The total loss in vessels, boats and gear in 1963 was estimated to be in the vicinity of $2,000,000. The value of draggers, longliners and small boats lost accounted for one-half a million dollars, while the loss of lobster traps, weirs, nets and other fishing equipment made up the balance.

Thirty-seven persons were reported to have lost their lives while engaged in fishing during the year 1963. Twenty-eight were commercial fishermen and nine were sports fishermen.

Educational Work

During the year Protection Officers attended meetings and addressed groups such as fish & game associations, youth groups and schools throughout the Maritimes on the subject of "Conservation." They were also in attendance at sportsmen's shows and fisheries exhibitions where they explained matters pertaining to the Department of Fisheries and issued literature to the public. Assistance was provided to the Search and Rescue Service in selecting suitable agents to act in search and rescue posts along the various sections of the coastline.

Salmon Investigation

The Saint John River salmon distribution study was continued and expanded in 1963. A total of 390 adult salmon were bought from the drift-net fishermen and from the harbour weirs for tagging during the regular season. Efforts to obtain salmon by drift-netting before the season and by fishing a spear-net in the river above the harbour during the fall were unsuccessful. Although the counting fences on Salmon River and Kennebecasis River were not completed in time to obtain information on movements of tagged fish to these lower streams, tag returns by the spring of 1964 from other sources are about 27 per cent. These returns were obtained from the Tobique and Beechwood fishways, from anglers along the main

Saint John River and the commercial fishermen operating in the river, harbour and Bay of Fundy. The largest returns were obtained from the last-named. Of the 31 tag recoveries made on the river above Fredericton, only one was from the drift-net operation.

A record number of 8334 salmon were counted through the Beechwood fishway during the year and about 86 per cent of this run was composed of grilse. The Tobique River fishway count was only 46 per cent of the Beechwood run as compared to 50-70 per cent in former years.

Tagging an Atlantic salmon smolt with a Carlin-type tag.

Operation of the electronic fish counter and camera unit showed that it blocked fish passage in the transportation channel where it was located, so the testing of this apparatus was discontinued in mid-July and the unit was removed.

The counting fence at Big Salmon River was not completed until early in November, so no check point was available for examining tagged returns from previous stocking of tagged smolts of early- and late-run parentage. Anglers returned five tags, all of which were from the late-run stock and were angled in Big Salmon River after the end of July.

Pollution

Pollution investigations involved the use of caged fish (salmon parr) to monitor stream habit affected by base metal mining operations in northern New Brunswick, forest spraying in central New Brunswick and pulp mill effluent on the St. Croix River, New Brunswick. In the base metal mining areas, the major problem centered around Heath Steele Mines' operation which caused lethal conditions in the Tomogonops River and unsuitable conditions for upriver fish migration in the Northwest Miramichi during certain periods of the year.

In the forest spraying operation, DDT (¼ lb per acre) was used over most of the area, with some sections receiving a second application of DDT at ¼ lb per acre while in others Phosphamidon (½ lb per acre) was sprayed along the main stem of the larger salmon streams and on an experimental stream. Caged fish mortalities in the experimental area sprayed with Phosphamidon were similar to the control fish; in areas receiving Phosphamidon on the main river but DDT spray on the tributaries, caged fish mortalities were fairly high; in areas receiving two applications of DDT, caged fish mortalities were extremely high.

On the St. Croix River, the August caged fish tests indicated that lethal conditions existed from pulp mill effluent during average and low flow periods but high water levels reduced caged fish mortalities.

Other Surveys

Investigations to obtain information on which to base management procedures were carried out on the upper Magaguadavic system in New Brunswick, West Branch Bear River, Digby County, Black Brook, Kings County and Milo Lake System, Yarmouth County, Nova Scotia.

Surveys were required on several streams in Nova Scotia on which storage dams were proposed and on 38 streams on which farm ponds may be constructed. Such surveys are necessary to gather information on the species of fish inhabiting these streams so that proper facilities and/or flows can be recommended to protect the fisheries interest in these areas.

The year 1963 was a very active one for the engineering section which was enlarged to nine members during this period with the appointment of one engineer in June, one technician in March and two in October. In addition to the routine construction and maintenance projects associated with the operation of the Department's fish culture stations, a miscellany of other problems were encountered. The major projects were associated with the construction or proposed construction of dams on important salmon rivers.

With the proposal by the New Brunswick Electric Power Commission to build the Mactaquac Dam on the Saint John River about 14 miles upstream from Fredericton, engineers and biologists of the Maritimes Area, consulting with those of the Pacific Area, designed tentative fish facilities for the project. In expediting this work, two visits were made to Niagara Falls to confer with the project consultants and to view a hydraulic model of the development. This project is continuing.

Fish facilities for the Eel River Dam being constructed by the town of Dalhousie were designed and incorporated in the design of the structure.

The Nova Scotia Power Commission undertook the reconstruction of two storage dams in 1963, one at Marshall Falls on the East River, Sheet Harbour,

and the other on the Carleton River, Yarmouth County. Departmental engineers were instrumental in having provision made for the inclusion of fish facilities in these structures.

Investigations were started for the selection of a suitable location for the proposed experimental fish culture establishment. Four areas have been surveyed to various degrees with test drilling being done at two of the sites to determine subsurface geological conditions and possible groundwater sources.

Minor problems were encountered with respect to water obstructions and stream clearance work. Some of these problems have been completed satisfactorily while others, such as the obstruction on the Big Salmon River, Saint John Co., N.B., are still pending.

Counting fence, Salmon River, Queen's County, New Brunswick.

Active construction accounted for the major portion of engineering staff time from April to October. The larger projects connected with the upkeep and improvement of the Department's fish culture stations were let out to private contractors in eight contracts covering the construction of a new sub-hatchery at Miramichi; completion of the sub-hatchery at Lindloff; heating installations at Lindloff and Margaree; alterations to the hatchery water supply dam at Cobequid; removal of the old hatchery building at Florenceville; and construction of a concrete retaining wall at Margaree.

Design of the Department's first oyster hatchery was completed and a contract let for its construction in July. Progress was very good until an unfortunate explosion in the firebox of the boiler unit caused a delay in completion of about two months. It is expected that the hatchery will be operational for preliminary testing early in January 1964.

Three salmon counting fences were constructed in New Brunswick to aid biological studies of Atlantic salmon. Two of these were on tributaries to the

lower Saint John River, the Kennebecasis River, Kings Co., and Salmon River, Queens Co. The third fence was constructed on the Big Salmon River, Saint John Co. Unseasonable water levels, early in September, coupled with a late construction start, resulted in late completion and postponement of the beginning of the biological studies until 1964.

Work completed using Departmental forces included the installation of 1300 feet of hatchery water supply line at Cardigan and 100 feet at Florenceville; refinishing nine long ponds and construction of 300 feet of timber crib retaining wall at Saint John; construction of 60 feet of timber crib retaining wall at Coldbrook plus several minor projects.

Fish Culture Stations (see also Appendix 2)

Fourteen full-time and three seasonal Fish Culture Stations were operated during 1963. To improve the efficiency of this section, New Mills Salmon Pond was amalgamated with the Charlo Station, and the hatchery section of the Middleton Station was closed and Nictaux Ponds was made a functional part of the Coldbrook establishment.

Salmon Egg Collections

Salmon collections were made on the Restigouche, Miramichi and Saint John Rivers, River Philip and the Margaree River, as well as in the Bay of Chaleur. Flood tides and unfavourable water conditions, at collection times, resulted in a poor collection year—down 40 per cent below normal. For the first time it was necessary to obtain Ministerial permission to take adult salmon from the skip-hoist at the Beechwood dam. Salmon adults were also taken at the Fisheries Research Board fence at Curventon on the Northwest Miramichi River. A total of 10.5 million salmon eggs were collected from the salmon taken at the above sites.

A total of 94,000 landlocked salmon eggs were collected from Chamcook Lake. Also, by arrangement with the State of Maine, 90,000 eyed landlocked salmon eggs were received from that state's East Grand Lake collection.

Trout Egg Collections

In 1963, the following eggs were collected: 34 million speckled trout eggs, 3.6 million brown trout eggs and 0.75 million rainbow trout eggs.

Egg and Fish Distributions

A total of one million eyed speckled trout eggs were transferred to Jasper National Park, Alberta. One million salmon eggs were supplied to various fish culture agencies in Canada, Australia and the United States.

The following numbers of fish were distributed in the waters of the Maritime Provinces during the year: 21.75 million speckled trout; 11 million Atlantic salmon; 3 million brown trout; 200,000 rainbow trout; 135,000 sebago salmon; and 200,000 lake trout. Federal fish culture stations again supplied 125,000 speckled trout fingerlings to the Nova Scotia Government's trout rearing ponds at Moser River.

Oyster Culture

The Department of Fisheries and Fisheries Research Board of Canada continued co-operative investigations during 1963 to improve the position of the oyster industry in the Maritime Provinces.

The Department of Fisheries' efforts were under the jurisdiction of the Area Director, Maritimes Area, and the Fisheries Research Board's efforts under the supervision of the Director, St. Andrews, N.B. Biological Station.

Mortalities and Observations in the Oyster Population in Nova Scotia and New Brunswick areas

No new outbreaks of disease were observed or reported during the year 1963, which means it is still confined to an area from Cape George in Nova Scotia to the Bay Chaleur coast in New Brunswick.

Oysters taken from this disease-affected area during 1963 amounted to some 90,000 pounds in Nova Scotia, an increase of approximately 1,000 pounds over 1962, and to approximately 295,000 pounds in New Brunswick, which is an increase of about 55,000 pounds over 1962. Of the 90,000 pounds taken from Nova Scotia, 50,000 pounds came from the Pictou-Caribou area which was opened for public fishing this year for the first time since the disease killed off the population some time around 1955-56. This points out that the fishery in the Pugwash-Wallace area was down about 40,000 pounds from 1962. Inquiry into this situation led to the belief that a much smaller effort was put into the fishery this year than last in this particular area due to other employment opportunities.

The area known as North and South Harbour (Aspy Bay) in Cape Breton Island from all reports available show the landings are down by approximately 200,000 pounds but the brighter side shows that the fishermen were paid more per box for their oysters by approximately 15 per cent.

The only obvious explanation for the decline in catch is that this is a very intense fishery and will have to seek a level which may even be below this year's catch.

Results of Rehabilitation on Depleted Areas

No spread of disease was noted in 1963 and mortalities in transplanted stocks continued to be low.

Observations are continuing on native spat in rehabilitated areas.

At Malagash, Nova Scotia, mortalities suggest a high level of resistance.

At Shippegan, New Brunswick, mortalities suggest no resistance whatsoever.

At Neguac and Mill Creek, New Brunswick, where the disease did not appear to be operating in recent years, known susceptible oysters are now dying. Next year's results should clarify the situation, but there are grounds for optimism about the biological success of rehabilitation in these areas.

At Shippegan, New Brunswick, both larval and spat survival from transplant oysters is poor.

Oyster Seed Stock and Seed Farming

Oyster farmers, in general, continue to depend on picking "wild" oysters as a source of seed and also depend on contaminated areas to produce both seed and mature stock for their leases. A few lessees, in some areas, can depend on natural sets to keep their beds restocked but these instances are very rare. 1963 was the first year for some time that a natural set of any quantity was observed in the intertidal zone along the shores of Prince Edward Island. What the survival will be remains to be seen.

The Department of Fisheries placed 50,000 concrete coated cardboard fillers in the water this year on floats in the Bideford Reserve. A very good set of spat was obtained but growth was poor after mid-August due to drop in water temperatures. All of the 50,000 fillers have been placed on a selected firm bottom in the Reserve for the winter. In the spring of 1964, the fillers will be raised and again set out on floats for a period of from 4 to 6 weeks for further growth and then threshed.

The density of the catch was as follows:

Area	No. of fillers	Total visible set per filler	Total set over ¼" by fall
Paugh's Creek, Bideford Reserve, P.E.I.	50,000	2,800	190
Smelt Creek, Bideford Reserve, P.E.I.		2,480	36
Malagash Reserve, N.S.	6,420	400	—
Orangedale Reserve, N.S.	900	1,000	150
Shippegan Reserve, N.B.	3,740	none	none

Note: Spat over ¼" long by fall have a good chance of survival; visible spat smaller than this have only a fair chance.

A very limited number of cardboard fillers was placed in the water at the upper end of Caraquet Bay, N.B., where a light but encouraging set was obtained.

A total of 159 barrels of seed oysters was sold from the Seed Farm at Conway Narrows in the fall of 1963 to lessees in the Maritime Provinces at $10 per barrel plus shipping charges and containers.

The following is a breakdown of the distribution by Province of seed oysters sold to lessees over the last three years:

	1961	1962	1963	Totals
P.E.I.	75 bbls.	38 bbls.	88 bbls.	201 bbls.
N.S.	4 "	5 "	5 "	14 "
N.B.	59 "	49 "	66 "	174 "
Totals	138 "	92 "	159 "	389 "

The Seed Farm at Conway Narrows showed great improvement this year over the immediate previous year. Eel grass now seems to be under control in any parts of the area that are being fished either by the escalator harvester or by hand rakes. The massive bloom of the filamentous green alga that appeared in 1962 did not

appear this year and no additional mussel set was noticeable so the future of Conway Narrows, at present, looks much more promising than it did one year ago.

A check on a small planting of oysters made at Oak Bay, Charlotte Co., N.B., in September 1962, revealed that the oysters appeared to be surviving and growing favourably. From information obtained at the Biological Station, St. Andrews, N.B., it is evident that a spawning, although rather late, did take place during the summer. There is some question, however, whether the larvae found were produced by the seed oysters planted in 1962 or by the two barrels of Malagash, N.S. oysters planted by Mr. Jardine in 1963. It is concluded that oysters can be grown from seed with success in Oak Bay, with reproduction possible in the more favourable seasons.

It should be pointed out that Oak Bay is a contaminated area and that it might be difficult to find a clean water area for relaying within a reasonable distance. No doubt lessees in Oak Bay would appreciate any assistance that could be given them by the Department of Fisheries or the Fisheries Research Board with this relaying problem.

Oyster Leasing

The demand for oyster leases continued to be extremely high during 1963 with applications being received in numbers greater than could be dealt with by the survey parties.

As of December 31, 1963, a total of 1,020 applications for leases were awaiting examination and survey. The recent addition to the staff of a third survey party should help alleviate this situation although it will take several years to take care of the large backlog of applications that have accumulated over the past few years.

As of December 31, 1963, a total of 1,638 oyster leases containing a total area of 4,527.7 acres were in effect in the Maritime Provinces. This represents an increase of 105 leases and 377.7 acres over the same date last year. A breakdown of active oyster leases by provinces is as follows:

Prince Edward Island

County	*No. of Leases*	*Acreages*
Prince	629	2,076.40
Queens	260	649.37
Kings	12	26.0
Total P.E.I.	901	2,751.77

New Brunswick

County	*No. of Leases*	*Acreages*
Gloucester	338	647.47
Northumberland	141	504.7
Kent	71	181.3
Westmorland	5	19.0
Charlotte	1	3.7
Total N.B.	556	1,356.17

Five boundaries of contaminated areas in Prince Edward Island were established and four boundaries in Nova Scotia were established and marked with permanent markers. A considerable amount of time was spent by the N.B. survey party in connection with the distribution of seed oysters from Prince Edward Island to the New Brunswick lessees.

New survey monuments were established and a considerable number of old ones which had been destroyed were re-established, particularly in Gloucester Co., New Brunswick.

A complete examination of Tracadie Bay, N.B. and its tributaries was also carried out. Both the N.B. and P.E.I. survey parties were engaged for several weeks in carrying out this examination.

New oyster lease maps and other maps were drawn up, old maps were revised and oyster lease records were maintained at both the Ellerslie and Newcastle offices.

Construction

Construction on the Oyster Hatchery was commenced the second week of July 1963.

At the time of writing this report, the building had been completed and a large part of the equipment installed.

The staff of the hatchery has been appointed and have been familiarizing themselves with the equipment and techniques under the direction of Mr. Drinnan, Fisheries Research Board.

Nova Scotia

	No. of Leases	*Acreages*
Cumberland Co.	6	14.9
Colchester Co.	12	31.5
Pictou Co.	15	40.7
Halifax Co. ..... (Musquodoboit Hbr.)	2	13.5
Antigonish Co.	17	24.8
Mabou Harbour	1	2.9
Aspy Bay	19	55.1
Cape Breton Co.	2	2.0
Bras d'Or Lakes	107	234.37
Total N.S.	181	419.77

During the year 1963, a total of 231 oyster leases were cancelled for non-payment of rental. However, 130 of these leases have since been reinstated.

Oyster Lease Surveys

During the year, two survey parties were in the field carrying out oyster lease surveys and other surveys when necessary. One party with headquarters at Ellerslie, P.E.I. was responsible for the surveys in P.E.I. and N.S. The other party with headquarters at Newcastle, N.B. was responsible for the surveys in N.B.

Surveys carried out during the year are shown in detail as follows:

Prince Edward Island	
New areas surveyed	87
Old areas resurveyed	12
Other Surveys	4
Nova Scotia	
New areas surveyed	25
New Brunswick	
New areas surveyed	79
Old areas resurveyed	9

The Position of the Industry

Complete figures of production are not yet available but those at the end of November 1963 (3,740,900 pounds or 18,705 bbls. for $410,000) suggest that landings will be up by a considerable amount both in pounds landed and in landed value over 1962. This could be due to a more intensive fishery caused by a strong market and an increase in prices paid to the fishermen.

An interesting observation is that in Statistical District 83, where the total figures are available for the full year 1963, the lobster landings were down by $60,863 and the oyster landings were up by $60,804. In this case, one very closely compensates for the other.

The effects of the disease still continue to be felt on the mainland with a slight increase in landings, in the disease affected areas both in New Brunswick and Nova Scotia, but production still remains far below pre-epidemic levels.

The escalator harvester carried out fishing trials on public fishing areas in Schediac, Cocagne, Buctouche and Miramichi Bays. Results in Shediac Bay showed no signs of re-producing from transplanted stocks. However, the results in Cocagne, Buctouche and Miramichi Bays were more promising.

A more intensive survey was carried out in the Bay du Vin area with hand rakes by three local fishermen. The results indicate that this area might support a public fishery after 1965 but that the season should be limited to a short period at first, probably coinciding with the existing short quahaug season.

Areas to the north of Miramichi Bay, principally Shippegan and Caraquet, continue to show slow signs of recovery from the epidemic disease. The recovery of these areas could probably be speeded up by a massive transplant of resistance spat (as young as one year old) attached to cultch such as scallop shells, veneer rings or some other cheap and efficient materials. The reason for a transplant of stock at this early age is to have them acclimatized to the more northern waters for spawning. There is some evidence that the spawning behaviour with respect to temperature is imprinted at a very early age and is thereafter irreversible.

Eel Grass

Large areas in the Maritimes that were producing oysters prior to the epidemic disease are now almost unusable for oyster culture because of eel grass. The more

northerly areas of New Brunswick and the Malagash, Tatamagouche and Brule areas of Nova Scotia are the most affected. All areas in Prince Edward Island with a firm mud or sand bottom at suitable depths are heavily affected by eel grass. It is considered that some control over its increase is exercised by prosecution of an intensive fishery.

Some means of chemical or mechanical control over eel grass will have to be introduced before these affected areas can be fully utilized for oyster culture.

NEWFOUNDLAND AREA

Sports Fishing

The 1963 season for salmon angling was the most productive on record. The catch was slightly in excess of 33,000 fish, an increase of 7,000 over the previous record high of 26,000 taken in the 1962 season. Average weight of the salmon landed by anglers was 4.5 pounds, and the heaviest recorded for the season was a 33-pounder, yielded by the Highlands River.

There was an excellent run, and with favourable water levels throughout the season the effects of natural obstructions were minimized. The number of fish constituting the 1963 escapement to spawning areas was most encouraging.

Amendments to the regulations changed the season's opening date from June 5 to May 24, to coincide with the trouting season and, at the same time, reduced the daily bag limit from six to four fish.

Commercial Fishing

The licensing of commercial salmon fishermen was introduced. The new system of control, whereby on payment of one dollar a fisherman is licensed for the season, was favourably regarded, particularly by the fishermen themselves.

Generally, the regulations governing the commercial salmon fishery were respected. There were breaches in several areas, however, and court action was taken in all instances of detected violations.

In the lobster fishery, too, the co-operation received from fishermen and buyers in observing the regulations was heartening. Most prosecutions involved possession of undersized lobsters.

There were approximately 180 breaches of the Newfoundland Fishery Regulations. Convictions resulted in fines ranging mainly from $20 to $50. For violations of a more serious nature the fines imposed by the courts were proportionately heavier.

The educational program among fishermen was continued. Through discussions, film showings, and poster displays the need for conservation measures was emphasized.

Trawlers subject to ICNAF (International Commission for the Northwest Atlantic Fisheries) regulations respecting cod and haddock fishing were checked regularly for legal size trawl mesh.

Aerial patrol over the Gulf and Front areas was maintained throughout the sealing season, primarily to guard against encroachment of foreign vessels in

territorial waters. Pre-season and post-season flights were also made, for enforcement of the regulations with respect to opening and closing dates.

Weir construction, Indian River Spawning Channel, Newfoundland.

Patrol Vessels

A fleet of 11 patrol vessels operated in Newfoundland waters, including the Labrador area. Besides offshore patrol duties, the smaller boats were concerned with inshore protection and inspection activities.

The latest addition to the patrol fleet, the 179-foot *Cape Freels,* which was commissioned in July 1962, logged 25,000 miles in offshore assignments.

A more efficient operation resulted from the installation of radio-telephone systems at Area Headquarters, St. John's, and District Office, Bonavista. Five of the patrol vessels were equipped with new radio-telephone sets, also contributing to improved communications and a more effective patrol organization.

Bay Seal Bounty

Bounty payments to fishermen for the destruction of bay seals amounted to $7000. Since 1953, when the bounty was introduced in Newfoundland, payments under this heading have totalled $90,000.

Exploits River Program

Biological and engineering investigation is underway to determine the feasibility of making available for Atlantic salmon production large unused areas of the Exploits River. There are indications that the area below Red Indian Lake, if accessible, should eventually be able to support a spawning run in the order of 25,000 salmon. The escapement to this river in 1963 was less than 1500 fish. Realization of the potential would make the Exploits a very significant contributor to the commercial and sport fisheries for salmon. If the improvements necessary

can be effected on an economically sound basis, it is hoped that initial construction steps can be taken in 1965.

Adult Salmon Transfer

It appears that the salmon transferred from Rattling Brook to Great Rattling Brook have spawned successfully in their new stream each year that they have been moved there, and that their progeny have moved to salt water in considerable numbers. The project, begun in 1957 and now complete, involved the transfer of a complete run of adult salmon, as a result of hydro development on Rattling Brook. Analysis of the 1963 field data should determine whether or not adult migrants have returned to Great Rattling Brook after their stay in salt water.

Artificial Spawning Channel, Indian River

A controlled flow spawning area for Atlantic salmon, located on the upper part of Indian River, Notre Dame Bay, has been completed. High water levels early in the year necessitated construction of a new main control dam and, because of this, salmon were unable to enter the spawning area until September. Nonetheless, 110 fish entered in September and October and successfully spawned.

This spawning area was constructed to compensate for loss of natural spawning grounds due to a water diversion for hydro electric purposes by the Bowater Corporation. Under the controlled conditions, survival from the egg stage should be much greater than under natural conditions, resulting in larger numbers of adults returning to the fisheries. Costs of the facility were shared by the Department of Fisheries of Canada and the Bowater Corporation.

General Pollution Control

Additional investigation was carried out to measure the effect of industrial and domestic wastes spilled to the Exploits River. This investigation is also associated with the Exploits River Development Program referred to above.

Pollution checks were also carried out at the sites of several mining developments. These related particularly to the effect on the receiving waters of mine concentration wastes.

Lake Investigations

An investigation of landlocked salmon in Flatwater Pond on the Baie Verte Peninsula was conducted by a survey team from the University of Waterloo, Ontario, in co-operation with the Department. Similar work will be undertaken in 1964. Memorial University of Newfoundland, in co-operation with the Department, is also planning a freshwater investigation. Efforts such as these are directed towards problems on which information is required for management purposes.

Engineering Construction and Surveys

Four concrete dams were built below a falls on Bernard's Brook, Conne River. The falls proved a major barrier to full utilization of the tributary by

Atlantic salmon. The dam raised the level of the pool, so that fish passage is no longer blocked.

Substantial repairs were made to fishways on Great Rattling Brook, Exploits River and Lomond River, which had been damaged by water and ice in the spring.

Topographic surveys were carried out at sites of several natural and artificial obstructions on Great Rattling Brook, Indian Bay River, Northeast Placentia River, Torrent River and Exploits River.

General

It was confirmed that a well established run of anadromous (sea run) Arctic char occurs in a tributary of Parsons Pond River. Heretofore, only one small run of this species was known to exist on the Island. It is likely that runs exist in other rivers, particularly on the Great Northern Peninsula.

For the first time, an alewife was recovered well inland on the Humber River. Although this species had been reported previously, it had always been from estuarine or marine areas. This recent record suggests the possibility of a small spawning run to the Humber.

Also, in 1963, a tagged adult salmon released in Great Rattling Brook, Exploits River, in 1961, was recovered at Holsteinsborg, Greenland. The straight line distance between the points of release and recapture is approximately 1200 miles.

Departmental Vessels

THE PROTECTION Branch of the Conservation and Development Service operated a fleet of 79 vessels during 1963 and also chartered a number of boats as required to augment the regular patrol service. In addition, the Newfoundland Bait Service of the Department operated a refrigerated cargo and freezer ship, the *Illex* (formerly *Arctica*). A replacement for this ship, a new *Arctica,* was under construction at Lauzon, Levis, P.Q., to be of modern design and with enlarged capacity. The fleet in 1963 consisted of the following:

Protection Service

Name	Tonnage	Length	Crew
Maritimes Area—			
Acartia	7	37′	2
Buctouche Light	25	45′	3
Cardita	15	45′	3
Cheval Point	12	39′	3
Cratena	56	65′	5
Cumella	65	65′	6
Cygnus	524	146.3′	29
Fabia	12	32′	2
Gull Light	12	39.4′	2
Hyperia	11	40′	2
Kildare Point	10	41′	3
Lacuna	61	64.5′	5
Limanda	61	64.5′	5
Maces Bay	50	60′	5
Marcia	15	45′	3
Modiolus II	13	38.7′	2
Mya II	13	38.7′	2
Neguac Light	15	42′	3
Obelia	8	36′	2
Paphia	15	45′	3
Prim Light	12	39.5′	3
Rossia	12	38′	2
Sabella	56	65′	5
Scatari Light	15	42′	2
Serpula	13	42′	2
Shediac Bay	50	65′	5
Tegula	15	45′	3
Yorke Point	—	26′	1
Newfoundland Area—			
Aurelia	29	48′	3
Badger Bay	48	57′	3
Boltenia	29	48′	3
Cape Freels	696	179′	28
Eastern Explorer	58	73.5′	8
Garia Bay	54	65′	5
Lomond	17	46.6′	2
Louise Ruth	20	41.8′	2
Nebalia	29	48′	3
Pecten	16	36′	2
Porella	20	48′	3

Name	Tonnage	Length	Crew
Central Area—			
Marila (Great Slave Lake)	15	45′	2
Rae Point (Great Slave Lake)	18	40′	2
Pacific Area—			
Agonus	19	37′	2
Arrow Post	44	54.6′	4
Atlin Post	45	61.5′	5
Atolla	16	37.3′	1
Babine Post	52	55.7′	4
Beaver Rock	26	51′	3
Bonila Rock II	23	47′	3
Brama	19	42′	1
Branta	10	36′	1
Chilco Post	48	63′	5
Ciona	14	34.5′	3
Clavella	38	52′	4
Comox Post	45	54.2′	4
Daphnia	13	34′	1
Diaphus	16	39.6′	1
Egret Plume II	25	46.5′	3
Falcon Rock	18	50′	3
F.D. 102	11	34.1′	1
F.D. 202	18	38.2′	2
Gavia	17	40.7′	2
Howay	198	115.7′	15
Hunter Point	139	90.6′	11
Kitimat	79	79.7′	9
Laurier	201	113′	15
North Rock	20	45′	1
Onerka II	25	46.5′	3
Pholis	16	37.3′	1
Pillar Rock	26	51′	3
Rissa	10	36′	1
Sarda	8	31.9′	1
Seal Rock	24	43.5′	2
Sooke Post	52	55.7′	4
Star Rock	18	39.9′	2
Statistic	10	30′	2
Stuart Post	44	54.6′	4
Temple Rock	16	45′	2
Takla Rock	6	26′	1
Thrasher Rock	17	36′	1
Bait Service			
Newfoundland Area—			
Illex	313	135.6′	15
Inspection Service			
Newfoundland Area—			
Belle Bay (laboratory vessel)	39	63.5′	4
Fish Culture Service			
Maritimes Area—			2
Ostrea	8	35′	(when required)
Cyprina	10	34.8′	2

Inspection Service

DURING 1963 the Canned Fish and Shellfish and Cannery Inspection Regulations were amended to provide colour standards for canned tuna fish. The colour of the flesh must now be indicated on the label in accordance with the colour classifications set out in the Regulations.

Inspection fees for canned British Columbia salmon and herring were abolished early in the year.

The requirement that Grade B canned Pacific salmon be double-capped was revoked in 1963.

Legislation was introduced in 1963 to provide that each can of fish or shellfish be embossed with code markings that identify the cannery and indicate the day, month and year of canning.

The Fish Inspection Regulations were amended in 1963 to provide standards for comminuted fish blocks.

More precise controls over the packing, selling, exporting and importing of smoked fish products packed in containers sealed to exclude air were also introduced in 1963.

Draft of regulations proposing compulsory registration of establishments processing fresh or frozen fish for export were prepared and referred to industry.

During the year large-scale improvements and additions to existing processing facilities were carried out by the fishing industry.

Voluntary inspection under Canadian Government Specifications Board standards continued to be well received, both by industry and by buyers.

In recent years very significant advances have been taking place in the field of fish technology. An increasing selection of fish and fish products is becoming available to the consuming public which is demanding higher quality. In order to keep abreast of these advances the Fish Inspection Laboratories have been working on the development of product standards and the adaptation of analytical methods to quality assessment of a variety of fish and fish products.

Newfoundland Area

The number of salt fish plants registered was 55. This was six less than in 1962.

Grades for export markets were basically unchanged, as were inspection procedures, except that, on occasion, due to heavy demands, inspection was carried out on a spot-check basis. The quantity inspected was 490,885 quintals, comprised of 210,261 quintals "light salted" and 280,624 quintals "heavy salted".

There was an increase in the number of shipments of light salted, heavy salted and saltbulk cod. Some of the saltbulk produced in the Labrador area was shipped direct to Norway and Portugal, and for the first time in many years, saltbulk was also shipped to Greece. On the other hand, the quantity shipped to the Canadian mainland declined.

Substantial quantities of light salted cod were inspected for shipment to Italy and Spain. Out-of-the-ordinary inspections included quantities of extra hard dried heavy salted for East Pakistan and Indonesia. These shipments were purchased by the Government of Canada for the World Food Bank.

During 1963 competition among local buyers for the light salted production was very keen.

There were no major complaints from any of the foreign markets with respect to the quality of salted fish.

A course for Inspection Supervisors and senior Inspection Officers, on grading and on the production and inspection of boneless salt fish, was conducted in August at the Valleyfield Fish Processing Experimental Plant.

Thirty-one premises were registered for the processing of filleted fish for export, including five new plants, at Harbour Breton, Port de Grave, Carbonear, Rose Blanche and Charleston. All but three of the filleting plants also carried on freezing operations, and all had the services of qualified Inspection Officers throughout production periods.

A major loss to this segment of the industry was the destruction by fire of the plant at Trepassey, early in the year. The Trepassey plant was one of the filleting and freezing operations in Newfoundland with CGSB (Canadian Government Specifications Board) quality rating.

Under authority of the Fish Inspection Regulations, approximately 23,000 pounds of fillets were rejected. This fish was judged unfit for human consumption, and was used instead in fish meal production. The Inspection Regulations authorize the disposal of fish found to be tainted, unwholesome or decomposed.

Quality of the frozen production was generally good. Plant operations were satisfactory. However, on occasion, corrective action was taken with respect to sanitation, offal disposal, and water supply.

As the year ended, two additional plants were being made ready for certification under the Canadian Government Specifications Board.

There was an increase in the amount of pickled fish inspected, even though production of pickled turbot and mackerel was less than in 1962. There was a rise in the output of pickled herring; the quantity inspected was 12,923 barrels, compared with 10,970 barrels in the previous year. The increase was due mainly to a very good herring fishery in Placentia Bay early in the year. The quantities of pickled turbot and mackerel inspected were 2,034 barrels and 1,129 barrels, respectively.

Inspection of pickled trout and salmon was practically on a level with that of 1962.

Reports indicate that the quality of the entire 1963 production of pickled fish was satisfactory.

Through a continuing program of quality control, the Inspection Laboratory ensured the marketing of acceptable products. On a daily basis, samples of production by the various filleting and freezing plants were bacteriologically and chemically analysed. On-the-spot sampling of end-of-line production was also effected through facilities of the floating laboratory — the M/V *Belle Bay*. Salted and pickled fish, as well as by-products, were likewise sample-tested prior to export. In all, some 7,000 samples were examined by laboratory staff. As in the past, particular emphasis was placed on the examination of plant water supplies.

Where necessary, technical advice and assistance were provided to industry in filleting and freezing operations, pickling, salting and canning, and in the production of by-products, especially fish meal, cod liver oil, and solubles.

Analyses of by-products established the content of protein, fat, ash and moisture in fish meals, and Vitamin A in fish oils — determining factors in market values.

Assistance was given to industry on a number of technological matters relating to processing of a variety of products.

All salt imported for use in the fishery was tested to ensure conformity with established requirements. A special project undertaken, and to be continued as time permits, involves the analysis of chalky flounder.

Maritimes Area

Significant advancements were made during 1963 in the Department's program for the inspection of fresh and frozen fish plants and canneries in the Maritimes Area. With few exceptions, all plants were visited at least once daily by inspection officers. The detailed sanitation check sheet used by inspection officers for recording plant housekeeping procedures was adopted by many plants as an integral part of their own quality control program. Inspection officers submitted weekly and bi-weekly end-of-line samples from all plants to the laboratory as a routine check on the effectiveness of the plant sanitation program.

A thorough survey was made of all fresh frozen plants to determine the degree of compliance with the proposed standards for construction and equipment for such establishments. A similar survey was carried out in 1963 on all canneries in the Maritimes Area for the purpose of revising established minimum standards for their construction, equipment, and operation.

On many occasions throughout the year, the Inspection Service assisted industry with respect to layouts for new plants and renovations to existing structures.

In 1963, Inspection Officers co-operated with Protection Officers in successfully curtailing illegal lobster operations in Prince Edward Island and New Brunswick.

Three intensive training courses of one-week duration each were held in March for Inspection Personnel. These courses covered most aspects of fresh and frozen, cured and canned fish inspection.

A one-week canning course was also offered to industry in Prince Edward Island. Twenty-six members of industry and eight inspection officers attended.

A number of new fresh and frozen fish plants were constructed during 1963. These additional facilities will increase the processing capacity in the Maritimes Area by some 100 to 150 million pounds of round fish per year.

During the year two additional plants were certified under CGSB, raising the total to ten government-approved plants in the Maritimes Area. CGSB production of fresh and frozen fillets, as well as breaded portions, amounted to 29,683,000 pounds. This is an increase of more than one million pounds over 1962.

The poundage of groundfish inspected in non-CGSB plants during 1963 amounted to 122,752,000 pounds. This represents an increase of 28 per cent

over 1962. In addition, 1,510,000 pounds of smelts and 12,584,000 pounds of swordfish were inspected. The increase in inspection resulted mainly from the greater emphasis being placed on daily inspection of sanitary practices in the plants. During these inspections the Fishery Officer also determined the quality of the fish being processed.

The landings of scallops increased by approximately 2½ million pounds over 1962 with 16,193,000 pounds being inspected in 1963.

During the year, two new scallop plants were certified under CGSB, bringing the total of such plants approved to 20.

In 1963, an estimated 2,703,000 pounds of fresh and frozen lobster meat were inspected, representing a decrease of 23 per cent from 1962. The price for the finished product, however, was the highest ever enjoyed by industry.

The export of oysters in the shell increased about 23 per cent over 1962. The total quantity exported during 1963 was 4,008,000 pounds. The production of shucked oysters declined from a reported 260 gallons in 1962 to 22 gallons for 1963.

The quantity of shucked clams for 1963 amounted to 20,920 pounds or about one-half of the 1962 production.

Tuna landings increased from 200,000 pounds in 1962 to 1.2 million pounds in 1963, thereby representing the development of a further fisheries industry of major significance.

In 1963, 57,985,000 pounds of cured fish (salted, boneless, pickled and smoked) were inspected. This represents an increase of seven per cent over 1962. Cured fish reinspections in 1963 totalled over two million pounds, an increase of 19 per cent over 1962.

Production of pickled alewives, pickled mackerel, boneless pollock, semi-boneless cod, dry cusk and heavy salted salt bulk decreased in 1963. However, increased production was registered for all other types of cured fish products. For example, production of boneless cod increased by 800,000 pounds, thereby bringing the total produced to over eight million pounds. The amount of dry cod increased from 16.7 million pounds in 1962 to over 19 million pounds in 1963.

During the year, inspection officers were instrumental in raising the level of sanitation in cured fish plants. All curing tanks were required to be housed in properly constructed buildings and this resulted in a number of new plants being built and improvements being made to a number already in existence.

In 1963, candling tables were required to be provided in boneless salt fish plants and mechanical presses were required to be provided in dry fish plants prior to registration of either type plant. The use of this new equipment in each instance resulted in a better product and lower production costs to plant operations.

There were no prosecutions of packers of cured fish under the Fish Inspection Act in 1963.

In 1963, 1,380,010 cases of domestic canned fish products were inspected and this about equals the 1962 production. The pack of 2½ oz. and 5 oz. canned lobster decreased in 1963 whereas production of lobster paste, lobster cocktail, chicken haddie, mackerel and herring increased over 1962. The quantity of sardines packed was about equal to that produced in 1962 when over one million

cases (100 cans per case) were canned. Following reinspection a total of 557 cases of canned fish was confiscated because of unsatisfactory quality.

A new, large, fresh and frozen lobster meat plant was constructed at Summerside, P.E.I., in 1963. Plans were also well advanced for construction of a lobster meat plant at Red Head, P.E.I., and a tuna cannery at Yarmouth, N.S.

There were no prosecutions under the Meat and Canned Foods Act in 1963.

In addition to their function in quality control of fish and shellfish products in 1963 the Fish Inspection Laboratories in the Maritimes Area conducted investigational work on the development of product standards, the adaptability of analytical methods to quality assessment and effect of certain additives on product quality.

Laboratory inspections of domestic production in 1963 consisted in part in the routine examination of 2,092 canned fish and shellfish samples and the sterility testing of 510 other canned fish and shellfish samples. 1,709 end-of-line fillet samples and 414 scallop samples were also examined by the laboratories in the Maritimes Area. These routine examinations effectively prevented "unfit" fish from reaching the consumer.

Inspection Laboratories at Halifax and St. Andrews examined 2,426 sample lots of imported canned fish and shellfish representing a total of 8,071,853 pounds. Following reinspection, 73 complete lots and 12 part lots, representing 57,545 pounds, were found unsuitable for entry into Canada because of quality defects or because of the use of nonpermitted chemical preservatives or colouring agents.

During the year, 26,512 bacteriological analyses were carried out and 16,326 chemical analyses were performed by Maritimes Area Laboratories.

At the Halifax and St. Andrews laboratories, sea water samples collected by inspection officers from prospective sources of water supplies for processing plants were received and analyzed. In this way, assessment was made of the bacteriological quality of waters in Beamer Harbour, N.B., Cheticamp Harbour, N.S. and a lake in the Cheticamp area.

Mobile laboratory units operating out of Charlottetown, P.E.I., Shediac, N.B., and Halifax, N.S., made numerous visits to fish processing plants throughout the Maritimes Area in 1963, and were actively engaged in routine bacteriological control of sanitation in fish processing plants; assisting inspection officers in the survey and grading of plants in accordance with proposed minimum standards; instructing plant operators in the detection and prevention of fish spoilage and in processing techniques; determining the cause of excessive bacterial contamination; conducting sanitary surveys of prospective water sources and advising as to the location of sampling stations; and carrying out bacteriological survey work of oyster beds at the request of the Department of National Health and Welfare.

Senior members of the Inspection Service in the Maritimes Area attended a number of Technical Meetings and Conventions in 1963.

Quebec Area

In the Quebec Area, The Inspection Service participates in the administration of provincial Acts and Regulations pertaining to the issuance of provincial permits and certificates in addition to the administration of the pertinent federal Acts and Regulations.

The Quebec Area is divided into three districts for purpose of administration. The first extends from Montreal to Blanc Sablon on the north shore of the St.

Lawrence River and from Quebec City to Matane on the south shore, representing an area some 1,250 miles in length. The second district comprises the Gaspe Peninsula with the exception of Matane and covers a distance of some 260 miles. The Magdalen Islands make up the third district.

The fish and shellfish products examined include whitefish from the Central Provinces and Quebec; prepared items such as fish sticks and fish portions; fresh and frozen fillets, frozen fish blocks, fresh and frozen lobster meat, fresh and frozen Atlantic salmon, frozen eels; canned items such as clams, winkles, lobster, lobster paste and cod livers; smoked products such as "bloaters", and last but far from least the famous light salted dried cod known as "Gaspe Cure".

During 1963, the Inspection staff issued 107 permits for plants and canneries and inspected 28,893,378 pounds of fresh, frozen, smoked and salted fish. This represents 13 fewer permits compared to the number issued in 1962. The quantity of fresh, frozen, smoked and salted fish examined increased slightly over that of the previous year.

Two plants in the area are approved under CGSB Specification for fresh, frozen and prepared fish. It is expected this number will increase in 1964 as a number of firms have been carrying out extensive improvements to their plants to bring them up to CGSB standards.

In 1963, officers of the Quebec Area examined 24,470 cases of domestic canned fish and shellfish. This is a decrease of 4,593 cases from the 29,063 cases examined in 1962. The quantity of oil examined decreased from 66,491 gallons in 1962 to 45,268 gallons this year.

During the year, 256,235 cases of imported canned fish and shellfish were inspected. This was an increase of 10,272 cases over 1962. Inspection was also carried out with respect to 1,322,207 pounds of imported fresh, frozen and prepared fish during the year under review. This represents a substantial increase over the 260,720 pounds examined in 1962.

Inspection Officers continued daily routine examination of the production in fresh and frozen fish plants and periodically withdrew random samples of the finished product for forwarding to the Quebec Laboratory for analysis. During 1963, 789,321 pounds of fresh and frozen fish were rejected because of quality defects.

The field staff completed a total of 3,438 product inspections and 183 re-inspections during the year. Federal certificates were issued for 491 shipments of salted fish, pickled fish, smoked fish, frozen smelts and lobster meat. Provincial certificates were issued for 277 shipments of fresh and frozen fish, oils and canned fish.

The Quebec Area Laboratories continued to provide technical and analytical assistance to industry. Bacteriological analyses of product and plant water supplies were carried out during the year as well as numerous plant surveys. In addition the main laboratory at Quebec City conducted routine examinations with respect to fish sticks, imported fresh, frozen and packaged fish and domestic canned fish.

Inability to fill some vacancies in laboratory staff establishments necessitated the continuance of forwarding many product samples to laboratories in the Maritimes Area for examination.

Representatives from the Quebec Area attended fish training courses held in Halifax, N.S. and Valleyfield, Nfld. during the year. Senior members of the Quebec Area attended a number of Technical Meetings and Conventions in 1963.

Central Area

During 1963, the Inspection Service examined 20,682,226 pounds of whitefish prior to export. This compares with 21,401,630 pounds inspected in 1962. Certification was refused on 1,537,241 pounds in 1963. This was an increase of 366,956 pounds over the 1962 rejections.

The United States Food and Drug Administration refused entry to 463,871 pounds of whitefish during the year. In 1962, that agency rejected 267,657 pounds.

At the request of industry, Inspection Officers carried out voluntary quality inspections on 7,695,000 pounds of freshwater fish other than whitefish. This was about the same quantity as inspected in 1962.

There were 423,306 cases of imported canned fish sampled during the year, or about 7,000 cases less than in 1962.

Imported fresh, frozen or processed fish to a total of 6,937,000 pounds was examined for quality and labelling acceptability during 1963. This compares with 5,815,167 pounds examined in the previous year.

Fourteen processing plants in the Central Area are certified under CGSB standards, an increase of two over 1962.

More than 9,287,000 pounds of CGSB quality fish was produced in approved plants during the year under review. Of the total, 2,180,000 pounds were identified with the Maple Leaf designation of quality on the wrappers and containers.

The Inspection Laboratories at Winnipeg and Toronto continued with work in the development of the Department's program of plant and product inspection of fresh and frozen fish being produced under CGSB specifications. Routine examinations were carried out with respect to the many shipments of fresh and frozen fish imported through various ports of entry in the Central Area. Both laboratories engaged in a number of special projects requested by provincial agencies and fish processors, and in addition, carried out a number of winter investigational projects for the Department.

The canned fish laboratory at Toronto was completed and equipped late in 1963. This new addition to the Inspection Service facilities in the Central Area will be staffed and in operation in 1964.

The mobile laboratory was engaged in field work at Calgary, Edmonton, Buffalo Narrows, La Ronge, Winnipegosis, Gimli and Wheatley. Field work included shelf-life studies of new fish products, water and fillet analysis, investigation of the fishery on Lake Winnipegosis and quality control investigations.

Pacific Area

During 1963, the Fish Inspection Laboratory at Vancouver inspected 2,890 lots of British Columbia canned salmon, totalling the equivalent of 1,203,466 48-pound cases. This represents a decrease of 613,141 48-pound cases over 1962. Decrease in canned pink salmon production accounted for 70 per cent of the over-all reduction for the year.

The collection of fees for the inspection of canned salmon was discontinued following amendment to the Canned Fish-&-Shellfish and Cannery Inspection Regulations.

One lot of British Columbia canned herring, consisting of 70 cases of 48 ½ pound ovals in tomato sauce, was inspected during 1963.

During the year, 1,746 lots of canned fish and shellfish, totalling over five million pounds, imported into Canada through ports of entry west of the Great Lakes, were inspected. Of these, 24 lots totalling over 80,000 pounds were refused entry into Canada because of poor quality; another 353 lots were detained until labels had been amended to meet the requirements of the Meat and Canned Foods Act.

In 1963, 1,573 shipments totalling 6.8 million pounds of fresh, frozen and cured fish and shellfish entering Canada through British Columbia ports of entry were inspected. Because of unsound or unsanitary conditions, 14 shipments totalling approximately 22,000 pounds were refused entry. An additional 30 lots totalling approximately 85,000 pounds were detained until the labels had been amended to comply with the requirements of the Fish Inspection Act.

During the year, 600 boxes or approximately 120 tons of dried salt herring produced for shipment to the Orient were inspected.

Cans of salmon after they have been through the pressure cooker.

In the year under review, 13 plants operated under SGSB standards. These produced over 19.5 million pounds of fish approved under the Specification. Of this total, approximately 2 million pounds was produced as fresh or frozen steaks or fillets. The remainder was produced as fresh or frozen dressed fish.

In addition to the regular analyses involved in plant and product inspection and the inspection of imported fish products, the bacteriological staff assisted the Health Department of the Provincial Government by making a substantial number of tests on oysters and waters from oyster beds.

In March, the Inspection Branch assumed administration of the collection of samples and preparation of extracts under the Pacific Coast Shellfish Committee toxicity control program. Toxicity tests are carried out by the Laboratory of

Hygiene of the Department of National Health and Welfare, Ottawa. Nearly 600 samples were collected and extracted in the ten-month period. Moderately high toxicities found in the latter part of the year necessitated closures to the taking of clams in the coastal areas north of Rivers Inlet. It has become necessary to increase the number of sampling stations and frequency of sampling.

Reference colour standards of porcelain baked on steel for use in the classification of canned tuna into white, light and dark meat colour classes were completed during the year. Sets of these standards have been provided to the Department's other Fish Inspection Laboratories. Work was continued on the testing of a "demerit grading plan" for separating canned salmon into two grades within the present "Approved Quality" classification.

Taste panel studies were conducted in co-operation with the Consumer Branch to test the storage life of fish and shellfish products under home freezer conditions. During the year, the heat processing facilities and techniques used in each cannery were inspected and routine sterility tests were made on the product of each cannery.

The program of voluntary inspection of the sanitation and ice supply on halibut vessels and packers departing Prince Rupert was continued. It had been planned to extend this program to other ports in British Columbia, but this was impossible because of the shortage of qualified personnel.

Economics Service

SOME NEW responsibilities were attached to the Service during the year. The Director was appointed Canadian Commissioner to the International Commission for the Northwest Atlantic Fisheries and the Chief of the Economics Branch, Vancouver headquarters, was detached to assume temporary duty as Secretary of the Federal-Provincial Committee on Wage and Price Disputes in the British Columbia fishing industry. On the first day of the year the Halifax Branch assumed responsibility for the preparation of the annual statistical report to ICNAF for the Maritime Provinces.

No new major economic research projects were initiated during the year, but work on several projects was carried forward. Sport fishing evaluation studies were continued, based on surveys of sport fishing activities at two locations in Nova Scotia and New Brunswick. In the absence of any one generally applicable and accepted technique of benefit-cost measurement, several different methods of evaluation were applied to the data and the results assessed. Another project, a study of the economics of the Atlantic lobster fishery, was carried forward and a draft report prepared, after organization and analysis of data from a survey of lobster fishing enterprises in the five Atlantic provinces. The survey had collected information on the costs and earnings of lobster fishermen, including income from other fisheries and from other occupations in addition to fishing.

A report entitled *Economic Aspects of the Great Lakes Fisheries of Ontario* was completed and ready for printing at the end of the year. This study was undertaken pursuant to a recommendation by the International Great Lakes Fishery Commission on the need for research into the problems of production and marketing in the Great Lakes fisheries, and as a federal government commitment following an agreement between the provincial and federal governments as to the division of research responsibilities: the Government of Ontario would be responsible for the collection of statistics on all of the lakes and for the conduct of general biological research on Lakes Ontario, Erie, and Huron, while the Government of Canada would be responsible for biological research on Lake Superior, for lamprey research and control activities on all of the lakes, and for the conduct of technological and economic investigations throughout the area.

The study of the performance of various types of Atlantic fishing vessel enterprises was continued, in co-operation with provincial administrations. In 1963, preliminary reports on the previous year's operations were prepared and the annual report was published (*Costs and Earning of Selected Fishing Enterprises, Atlantic Provinces, 1961*), being the eleventh volume in the series, *Primary Industry Studies, No.* 1. This volume contains also data on the performances of given types of vessels over a number of years, comparing "high-liner" and "low-liner" with average performances. Data are given also on the relationship of size of dragger and horsepower of engine to fuel consumption.

Short-term investigations undertaken by the Economics Service in the Maritimes and Newfoundland areas included an appraisal of the inshore fisheries potential and a study of credit needs in the Newfoundland fisheries, carried out

in connection with the Newfoundland fisheries development program. Attention was given to the market potential and the early performance of the fledgling Canadian Atlantic tuna fishery. A report on the current production and marketing of tuna species with special reference to the Atlantic Coast situation was prepared, and the results of the first voyages of two new Atlantic tuna seiners were followed with interest.

Several staff members were engaged in preparing background papers for the federal-provincial conference on the Canadian fisheries held in Ottawa in January, 1964. A report on the economics of the Atlantic lobster fishery was presented at the annual meeting of the Fisheries Research Board of Canada. In co-operation with the Board the Economics Service continued advisory work in connection with the External Aid program of training and capital assistance under the Colombo plan. Also, a staff economist served on a resource studies working group of the Emergency Measures Organization and prepared a resource analysis of the Canadian fishing industry at both the primary and the secondary levels under a given set of conditions.

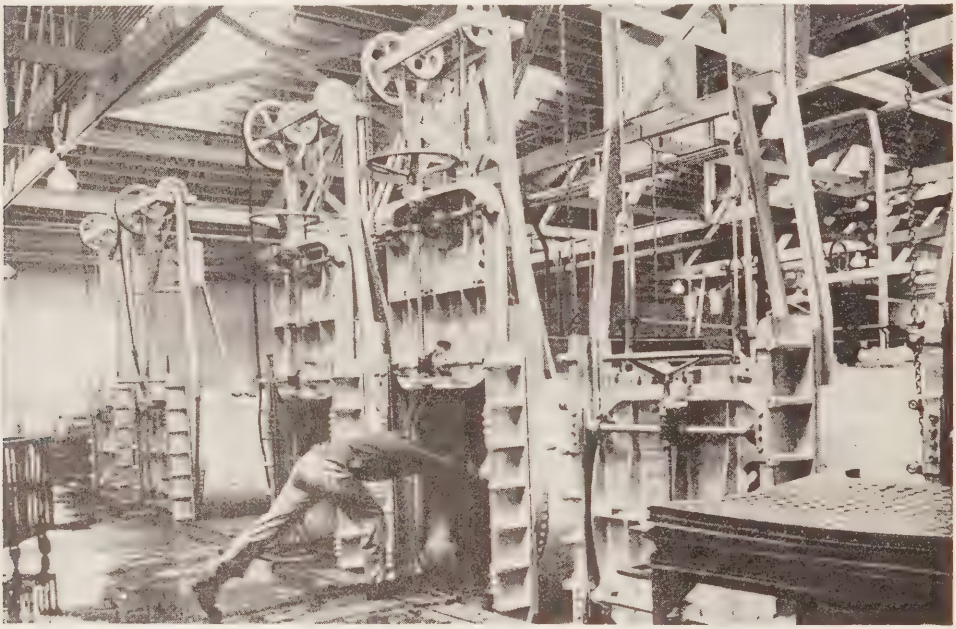
Statistical services, which are the main continuing function of the Intelligence Branch,were modified and developed during the year in co-operation with the Bureau of Statistics. In British Columbia a single fishing license was introduced, endorsed for each individual fishery, which replaced the prior system of individual licenses. A number is attached to each of the new licenses which allows the several activities of commercial fishermen, e.g. salmon trolling, groundfishing etc., to be collated at the end of the year. The collation is facilitated by the use of data processing techniques which allow, among other things, for the computation of the gross annual returns of commercial fishermen. Comparisons can be made from year to year of the gross incomes of all fishermen as well as those in certain occupational ranks, i.e., skippers, mates, etc.

Sports fishing continued to press upon salmon resources in certain locations on the coastline and additional effort was devoted during the year to estimates of numbers of persons fishing and fish caught by species and areas of catch. A special, and intensive, one day survey of sport fishing was conducted at the peak of the season. In addition, a start was made in the development of an inventory of sports fishing in tidal waters — men, boats and gear — to determine effort more precisely.

The purchase slip system, inaugurated in the North West Territories in 1961, continued to provide detailed catch statistics of importance to the administration of the lakes, and of interest to the export and import trade. The production of the standard series of fishery statistics for the Maritime Provinces, landings, values, products, etc., has been simplified and speeded up with increasing experience in the use of purchase slips and data processing equipment. New data is being supplied for research and administrative purposes. The responsibility for preparing the statistical submission to ICNAF was taken over from the Fisheries Research Board by the Economics Branch on January 1, 1963. In this process the Bureau of Statistics provides valuable assistance in machine conversions, sorting, tabulating and printing. In addition to statistical responsibilities the Branch carried out short run investigations of three minor fisheries — eels, bloodworms and crabs. Reports describing these fisheries were prepared for departmental circulation to provide background information which supplements the standard statistics.

In Newfoundland a survey was undertaken to assess the feasibility of utilizing a purchase slip to record landings and values for the industry, or parts of it. For various reasons it was not feasible to introduce such a system at the present time, but the possibility is still being explored.

The demands upon the Service, both at headquarters and in the field, for descriptive and statistical information about the fisheries, and especially those of the Atlantic Provinces, increased noticeably during the year. Such agencies as ARDA, the Atlantic Development Board, and the Economic Council of Canada have added their requirements to those referred to in earlier reports. To these



Loading pressure cookers with canned salmon.

domestic demands must be added those of international bodies like the OECD and FAO. Towards the end of the year preparation for the GATT negotiations began and standard trade data were prepared in detail in co-operation with the Department of Trade and Commerce. At the same time the Service was developing its contribution to the Federal-Provincial Fisheries Conference.

Members of the Economic Intelligence Branch continued to serve on several interdepartmental committees, for example those concerned with the trade in fishery products, fishing vessel assistance, and fishery statistics.

Information and Consumer Service

THE responsibilities of the Information and Consumer Service cover a wide range of activities and, because of the nature of the fishery resource, go far beyond the straight dissemination of news about the Department and its associated agencies. The informational aspect of the Service's functions calls for the use of a variety of communications media and requires direction of the Department's editorial work, publications, advertising, films and filmstrips, exhibitions and radio and television activities.

Working in co-operation with other Services of the Department, the Service carries out programs aimed at creating a greater public awareness of the fisheries as a vital basic resource, bringing about a full understanding of the conservation and quality control practices followed by the Department, helping other Services in their efforts to provide technical education for primary and secondary producers and others associated with them in the fish trade, and keeping the general public informed of all the responsibilities and activities of the Department, the Fisheries Research Board of Canada, and other governmental agencies involved in the fisheries.

The informational and educational activities of the Service in the interests of the fisheries generally are combined with those carried out at the consumer level, the latter being the promotion of fishery products for home, restaurant, hotel and institutional meals.

Thousands of individual enquiries were received in 1963. During the year the Information Branch mailed 97,217 items of printed material; this apart from the thousands of cookbooks distributed by the Consumer Branch. Information Officers in the field are located in Vancouver, Halifax and St. John's and home economists of the Consumer Branch operate in and out of Ottawa, Vancouver, Edmonton, Winnipeg, Toronto, Montreal and Halifax, where the Department has test kitchens. Demonstrations of fish cookery are given both in test kitchens and to outside groups throughout the country, and at conventions and exhibitions at which food products are items of interest.

INFORMATION BRANCH

The need to keep both the industry and the public informed of the rapid progress being made in recent years in both the primary and secondary branches of the fishing industry demands a constant flow of information from the Information Branch. This is because of the constant improvements in techniques and the increasing diversification of the fishing effort, as well as the fact that producing plants, transport and marketing methods are also going through an evolutionary process. Management of the fisheries by the Department is similarly changing as improved measures and regulations are put into effect and must be interpreted and explained.

For these special needs the Information Branch uses not only the aforementioned communications media but is active in the publishing field with a monthly magazine, *Trade News,* of general interest to the fisheries, and two specialized publications, *The Canadian Fish Culturist* and *Canadian Fisheries Reports.* The first named contains feature articles written mostly by staff members and occasionally by other officials of the Department and the Fisheries Research Board; the second contains papers prepared by Canadian scientists, mostly on the staff of the Conservation and Development Service, dealing with fish cultural procedure; and the last named contains specialized information on inspection, conservation, industrial development, fishing and processing techniques and related subjects. Circulation of all three publications extends beyond Canada to nearly all states in the U.S. and to countries all over the world.

The Information and Consumer Service makes fullest possible use of radio and television for special interviews, talks and fisheries news releases, as well as for the promotion of fishery products through instruction in cooking methods, etc. The radio division taped 59 broadcasts which were made available to networks and stations during the year. They included a monthly feature, "Ottawa Radio Reports", for the three CBC Fishermen's Broadcasts emanating from Vancouver, Halifax and St. John's. Special interviews with departmental officials were recorded for use on Canadian stations and for broadcast through the International Service of the CBC.

Slide sequences were prepared for television use in connection with the consumer program.

Selections of newly tested fish recipes, with suitable instructions, as well as timely hints to homemakers, were provided for 65 daily and 131 weekly newspapers by means of a monthly release, "Featuring Fish". Suitable illustrations were provided where required, and food photographs were also supplied to newspaper and magazine editors, along with special articles, on request.

"Fisheries Flashes", a monthly radio and television release, went to 112 radio stations and 16 TV stations which had agreed to broadcast them.

Films and filmstrips produced by the Department were used extensively in the Service's educational program in fishing areas. In the Maritimes, Newfoundland and British Columbia high school students, 4-H Clubs, fishermen, processors, service organizations and rod and gun clubs were given special attention by means of illustrated lectures and film showings by Information Officers in those areas. The Area Information Officers also gave individual service to newspapers and radio and TV stations on request.

The Information Branch was responsible for the Department's participation in a number of fisheries exhibitions. In the Maritimes, these included events at Pictou, Shediac, Summerside, Lunenburg and Yarmouth; in Newfoundland, St. John's and Corner Brook, and in British Columbia, the Victoria Exhibition. A fisheries exhibit continued as a major attraction at the Vancouver Maritime Museum. This display is built around consumer and ship model exhibits on loan from the Department.

Special projects occasioned by meetings of international fisheries organizations, federal-provincial fisheries committees, and the annual meeting of the Fisheries Research Board were also carried out by area and headquarters staff,

who organized and manned press and information bureaus as required. In Ottawa, a great deal of preliminary work was done in preparation for a Federal-Provincial Conference on Fisheries Development called by the Minister for January, 1964. This involved, among other things, the publication of all the background papers prepared by economists, scientists and other experts for the Convention.

CONSUMER BRANCH

Despite a shortage of professional staff caused by difficulty in replacing home economists who had left the service, and also by the absence of the Assistant Chief, who obtained a year's leave of absence to serve in India as a Nutrition Officer for the Food and Agriculture Organization of the United Nations, the Consumer Branch gave 342 fish cookery demonstrations, 59 television shows and 31 radio talks during the year. Workshops were conducted for home economics teachers, hospital cooks and government cafeterias. The demonstrations were given in various parts of Canada to dietetic interns, women's groups, university, teachers' college and secondary school students. At the Salon de l'Agriculture in Montreal, two bilingual home economists, in co-operation with a colleague from the Canada Department of Agriculture, gave a series of joint demonstrations to standing audiences. This was a new venture, and proved to be quite successful.

The Central test kitchen in Ottawa continued to develop new fish recipes for publication in cookbooks and press releases. Food pictures were taken to accompany the releases. Some experimental work, in co-operation with the Food and Drug Directorate on foreign foods utilizing fish protein concentrate as an additive, was undertaken. The results have not as yet been published. However it was found that fish protein concentrate can be used as an additive for foods without appreciable change in flavour at a five per cent level.

The regional home economists, in addition to their routine work, had varied activities. A television sequence of an actual school demonstration was filmed in a regional test kitchen. The home economists also participated in community affairs such as judging recipes for a local newspaper contest, writing articles for magazines, and acting as panelists or speakers at local conventions. A special series of demonstrations was planned in conjunction with the Co-operative Fisheries Limited of Saskatchewan, in which 10 major cities in the province were covered.

The home economist in the Pacific Area demonstrated outdoor barbecuing of fish on the CBC's national television network. She also co-operated with the staff of the Fish Inspection laboratory and conducted taste panels on home frozen fish products.

In order to maintain and make new contacts many conventions were attended. At some of these the Home Economists staffed Department of Fisheries Exhibits. These conventions were as follows: Tenth International Congress on Home Economics in Paris; National Consumer Producer Conference, Toronto; Canadian Restaurant Association Convention, Toronto; Consumers' Association of Canada, Winnipeg; Canadian Dietetic Association Convention, Montreal; Hotel and Restaurant Suppliers Association Exhibition, Montreal; Red River Exhibition, Winnipeg; Salon de l'Agriculture, Montreal; Nova Scotia Fisheries Exhibition, Lunen-

burg; Nova Scotia Home Economics Association Convention, Halifax; Annual Meeting of Innkeepers' Guild of Nova Scotia; Alberta Home Economics Association Convention, Edmonton; The Brandon (Man.) Fair, and the Nutrition Workshop in Communications sponsored by the Nutrition Division, National Health and Welfare, Ottawa.

A new booklet on low calorie recipes was prepared for publication. Over 100,000 booklets on fish cookery were distributed free of charge to the public.

INDUSTRIAL DEVELOPMENT SERVICE

THE ACTIVITIES of this Service continued in 1964, in the improvement and modernization of catching, processing and handling methods in the fishery.

The projects and activities in which the Service engaged included those described under the headings: Vessels and Gear, Engineering, and Special Services.

VESSELS AND GEAR

Stern Trawler Design

The design and operating characteristics of stern ramp trawlers were examined both in available literature and in actual operation in Canada and Europe, preparatory to undertaking the design of a modern vessel for Canadian Atlantic fishing operations.

Experimental otter board for mid-water trawling.

Trawl Design

A modified Western Trawl was designed and tested in fishing operations on the Atlantic Coast. Early results have been favourable, with increased catches, and several fishing companies are using nets of the new design.

Trawling Experimentation

Preliminary trawling operations carried out in Lake Winnipeg in co-operation with the provincial authorities have shown considerable promise, and the construction of a suitable vessel is planned to continue these operations.

Mid-Water Trawls

Assistance in the construction and operation of mid-water trawls was given to smelt trawler fishermen of the Great Lakes.

Pair Trawls

Assistance in the construction and operation of pair trawls for use in the pollock fishery was given to Nova Scotia fishermen; weather and other unpredictable circumstances adversely affected these operations.

"Green Waters", one of the seiners used in tuna operations out of New Brunswick.

Trawl Sounding Equipment

The use of echo sounding equipment mounted on trawl gear was investigated. The potential of this equipment has not been fully assessed; however, evidence indicates that it has considerable potential in the improving of trawling efficiency.

Tuna

With the co-operation of federal and provincial fisheries two 92-foot tuna vessels commenced operations out of New Brunswick in 1963 with encouraging initial results. Construction was commenced on a 167-foot tuna vessel which will operate out of Nova Scotia. It is considered that these vessels may well provide a nucleus for the development of a Canadian Atlantic tuna fishery.

Gill Net Fishing

The Service continued to demonstrate the use of gill nets in co-operation with the Atlantic Coast provinces; nets of various synthetic fibres were tried out to ascertain their relative effectiveness.

Mechanical hauling equipment was designed by the Service to enable the fishing of increased numbers of nets per boat. The haulers are gaining acceptance by fishermen.

Scallop Exploration

Exploratory scallop fishing operations were carried out in co-operation with the province of Nova Scotia in the Bay of Fundy, with worthwhile commercial results.

Longlining

Longlining for tuna and swordfish by a Newfoundland vessel, under federal-provincial sponsorship, was most successful, with substantial catches.

Crab Fishing

Efforts to develop a crab fishery in New Brunswick met with encouraging results. About 400 fishermen participated in this new fishery and commercial quantities have been canned.

Fish Detection Equipment

The Service investigated, in co-operation with the Newfoundland provincial fisheries authorities, compact, low-cost electronic detecting equipment for use in small boat fishing operations.

Small Boat Survey

A survey of the small fishing boats of the Atlantic Coast provinces was made by a naval architect and an officer of the Service to determine present day requirements, preparatory to the design of more suitable fishing boats.

Investigations Abroad

The Chief of the Service's Vessel and Gear activities served as a rapporteur at the second World Fishing Gear Conference in England and accompanied a Canadian group of provincial and federal fisheries representatives on a tour of the British fisheries.

A vessel and gear technologist attended an international meeting on stern trawlers called by the British Whitefish Authority and later made first-hand observations of some of the latest stern trawlers under actual fishing conditions.

Another vessel and gear technologist accompanied technical personnel and fishermen from the Atlantic provinces on a visit to the United States-Canadian Pacific Coast to assess the program of the off-shore tuna fishery.

Technical Assistance

The activities of the Department's fishing vessel and gear technologists were supplemented by the efforts of many expert fishermen employed on short term assignments. They were engaged on projects designed to improve the fishing ability of fishermen across Canada operating such equipment as gill nets, trawl nets and purse seines.

ENGINEERING

Highway Transportation

Work in co-operation with the National Research Council, Department of Agriculture, trailer manufacturers and manufacturers of refrigeration systems was concluded with the testing of a liquid nitrogen refrigerated trailer.

Some 100 trailers employing the jacketed refrigerated system, designed as a result of these investigations, are now in operation in Canada transporting frozen foods.

Fish Plants

Preliminary designs, layouts and cost estimates for fish processing plants were prepared for operations in inland and coastal regions. Recommendations and advice were given with regard to processing facilities, refrigerated storages and freezing facilities.

Freezing at Sea

Brine spray refrigeration systems were designed for the two tuna vessels operating out of New Brunswick.

Refrigeration systems were designed for two 91-foot combination vessels in British Columbia embodying equipment for salmon packing as well as the brine freezing and refrigerated storage of halibut.

Systems utilizing refrigerated sea-water were developed for two large British Columbia vessels converted to salmon packers.

Vessel Unloading

In co-operation with the Fisheries Research Board of Canada two systems were designed in British Columbia for the unloading of fish from vessels. One

system of hydraulic design has operated successfully in commercial operations for the discharging of salmon from packers to canneries. The other, a pneumatic system, has worked well in prototype and is felt, because of its simplicity, to have many possible applications to the fishing industry.

Salted Fish Drying

Experimental work in co-operation with the Memorial University of Newfoundland in the utilization of both high and low air velocities in the drying of salted fish was terminated. It is considered that this method for initial and final drying operations is ready for commercial application, especially for the processing of lightly salted fish.

Drum Drying of Fish

Pilot Plant operations in co-operation with the Department of Agriculture were carried out at the Department's Fish Processing Experimental Plant in the production of "instant" type fish potato mixes. Results with mixtures of both salted and fresh fish have been encouraging and arrangements are being made to produce quantities for product evaluation. Considerable interest is being shown in the product by food manufacturers.

Tuna Processing

Equipment for the cooling of cooked tuna for canning was developed in co-operation with the Fisheries Research Board.

Fish Processing Experimental Plant

The experimental plant located in Valleyfield, Newfoundland, continued to provide advice to industry on various aspects of processing, packaging and handling of various fishery products.

Storage and drying experimentation was carried out as well as activities in salting and smoking.

The plant's technical personnel visited commercial fish plants in the Atlantic Coast provinces in an advisory capacity and instructed industry personnel at the experimental plant.

Investigations Abroad

The Chief Engineer of the Service was an official Canadian delegate to the International Institute of Refrigeration Congress held in Munich, Germany. He visited other points in Germany, the Netherlands, Denmark, Norway, Iceland and Britain to observe fish processing and refrigeration installations.

SPECIAL SERVICES

The Service continued to administer the Department's programs of financial assistance to the fishing industry including grants under the Fishing Vessel Assistance Regulations, P. C 1961-1333, and the Frozen Bait Storage Assistance Regulations, P. C. 1959-904. The Service also continued to carry out its consultative and advisory responsibilities in respect of fisheries marine works and aids to navigation.

In the fiscal year 1963-64 grants totalling $500,000 were paid on 44 fishing vessels.

Fishermen's Indemnity Plan

ACCEPTANCE of the Fishermen's Indemnity Plan continued to expand through 1963. The Plan, which came into operation in 1953, offers fishermen operating fishing vessels the opportunity of securing insurance against total loss or partial loss for a nominal premium of one per cent of the appraised value of the vessel per annum. The Plan also provides a measure of low cost insurance to lobster fishermen on their lobster traps, items which frequently suffer widespread damage from unexpected storms.

During 1963, two significant changes were made in the vessel plan. The upper limit of eligible boats was raised from $10,000 to $12,500 to cover the increase in construction costs since 1957. The lower limit of $250 was retained. The other change was to reduce the deductible for partial loss in New Brunswick and Prince Edward Island, from 30 per cent of the vessel's appraised value to 20 per cent because of satisfactory loss experience in these two provinces.

At the close of 1963 a total of 6,719 fishing vessels were covered under this voluntary marine insurance plan. The Plan has been most widely accepted in British Columbia where 2,621 policies were in effect at the end of the year. In Newfoundland vessels owned by 1,389 fishermen were covered; in the Maritimes 2,116 vessels and in Quebec 593 vessels. It is estimated that about one-third of the eligible fiishermen have availed themselves of the Plan. Because of the wide dispersion of small fishing boats in many hundreds of small fishing settlements, commercial insurance companies have been reluctant to offer insurance to such fishermen at rates within fishermen's capacity to pay.

TABLE — FISHERMEN'S INDEMNITY PLAN

NET PREMIUMS COLLECTED AND INDEMNITIES PAID FROM INCEPTION OF PLAN (JULY 1953) TO DECEMBER 31, 1963

Province	Vessels		Lobster Traps	
	Net Premiums	Indemnity	Net Premiums	Indemnity
	$	$	$	$
Newfoundland	158,979	325,563	18,278	86,739
Nova Scotia	212,461	246,154	174,694	691,407
New Brunswick	62,972	54,674	628	1,070
Prince Edward Island	27,730	13,325	24,079	76,311
Maritimes	303,163	314,153	199,401	768,788
Quebec	47,630	98,108	13,762	35,649
Atlantic Coast	509,772	737,824	231,441	891,176
British Columbia	928,546	938,960	—	—
Total	1,438,318	1,676,784	231,441	891,176

Under the Plan fishermen pay a premium of one per cent of the appraised value of the vessel and in the event of total loss an indemnity of 60 per cent of the value is paid in the Atlantic provinces and 70 per cent in British Columbia where the loss experience has been less severe. In cases of partial loss, indemnity against the cost of repairing the vessel, in excess of 30 per cent of the appraised value, is paid in Newfoundland, Nova Scotia and Quebec, in excess of 20 per cent in New Brunswick and Prince Edward Island, and in excess of 15 per cent of the appraised value on the Pacific Coast. Since the Plan was introduced in July 1953 a total of 1,485 claims have been settled with total indemnity payments of $1,682,454.

In the case of lobster trap coverage provided under the Plan, acceptance by fishermen has been limited largely to those areas where weather and other conditions lead to heavy losses of traps almost every year. Thus indemnity payments have been relatively high in relation to premium revenue. At the same time lobster fishermen in other areas have occasionally suffered quite severe losses but unfortunately, having failed to come under the Plan by paying the small premium, were not eligible to receive indemnity.

Fisheries Prices Support Board

UNDER the Fisheries Prices Support Act, the Board is responsible for investigating and, where appropriate, recommending action under the Act to support prices of fishery products where declines have been experienced. The basic principle of the legislation is to protect fishermen against sharp declines in prices and consequent loss of income due to causes beyond the control of the fishermen or the industry. Under conditions of reduced prices and income to fishermen the Board, subject to approval of the Governor in Council, is empowered to purchase fishery products at prescribed prices or to pay deficiency payments to producers of fishery products equal to the difference between the prescribed price and the average price at which such products are sold.

Markets for fishery products generally continued favourable throughout 1963. For certain products, however, special circumstances resulted in some difficulty. In the case of pickled herring, mackerel and alewives and smoked bloaters prepared for the Caribbean market, political disturbances in some of the principal markets for these products resulted in reduced demand. Early in 1963, therefore, significant quantities of these products remained in exporters' hands at the end of the usual marketing season. In order to assist in the orderly marketing of these surpluses, the Board was authorized to enter into agreements with the exporters under which the Board undertook to absorb one-half of the price reduction necessary to market the pickled herring and mackerel up to a maximum Board obligation of $2.00 per barrel and up to 50 cents per box of smoked bloaters. Under this agreement, 2,087 barrels of pickled herring and 3,418 barrels of pickled mackerel were marketed. No bloaters were sold under the plan. Because of low production of pickled alewives in 1963, no action was taken on the carry-over from 1962 until after the end of the 1963 marketing season.

Marketing difficulties were also encountered by exporters of freshwater fish late in 1963 following several cases of botulism poisoning in the United States attributed to consumption of smoked fish of Great Lakes origin. The Board considered this problem at its meeting in February 1964 but as the markets had generally recovered early in February the only serious problem was a substantial carry-over of frozen sauger. This problem was under investigation at the end of the fiscal year.

The staff of the Board continued to administer the Fisheries Salt Assistance Program and the headquarters activities of the Fishermen's Indemnity Plan. Under the Salt Assistance Program fishermen and other fish processors using salt for the curing of fish receive a rebate of 50 per cent of their laid down cost of salt. On the basis of 1963 production of these items, payments were made to 6,236 fishermen totalling $382,336. Payments were also made to 328 processors amounting to $217,663. Total payments were $600,000.

The Board continued to co-operate with the Economics Service of the Department in the collection and analysis of costs of fishing operations in the Atlantic coast provinces.

Officers and members of the Board are: Chairman, I. S. McArthur, Ottawa; Vice-Chairman, K. F. Harding, Prince Rupert, B.C.; Members: W. R. Ritcey, Riverport, N.S.; C. E. Desourdy, Montreal, P.Q.; H. I. Mifflin, Catalina, Nfld.; Francis Millerd, Vancouver, B.C.; Executive Director, H. C. L. Ransom, Ottawa.

Fisheries Research Board of Canada

RESEARCH activities of the Fisheries Research Board of Canada are by design completely decentralized. Day-to-day administration and supervision of over-all operations is carried out by the Chairman and his headquarters associates in Ottawa. This staff numbered eighteen in all, including one who was located outside Ottawa.

The Board had an approved staff establishment of 816 for the period covered by this report. Of these 196 were scientific positions, although the number actually on strength averaged about 159 because of recruitment restrictions and normal turnover.

The year 1963 was an active and productive one for the Board in all three areas of its scientific interests, namely aquatic biology with emphasis on fishery biology, fishery technology, and oceanography. Seventeen research vessels were operated for its biological studies. These vary from small inshore and lake craft to large sea-going ships specially built for the purpose.

During 1963 a new research barge, the *Velella* (76 feet overall: 269 registered tonnage) was added to the Board's fleet on the Pacific Coast. The barge will serve as a floating laboratory and will be used initially as a base for the study of young salmon in the sea.

Co-operative oceanographic programs were continued with the Royal Canadian Navy, the Department of Mines and Technical Surveys, and the Department of Transport, and close liaison was maintained with the Institute of Oceanography at the University of British Columbia, Vancouver, B.C., the Great Lakes Institute of the University of Toronto, Toronto, Ontario, and the Institute of Oceanography at Dalhousie University, Halifax, N.S. Co-operative programs were also carried out with Provincial Governments and with the International Pacific Salmon Fisheries Commission, New Westminster, B.C.

A large proportion of the Board's biological and oceanographic effort in research continues to be devoted to work carried out for the international fishery and sea mammal commissions to which Canada belongs and which do not have scientific staffs of their own. These include the International Commission for the Northwest Atlantic Fisheries, the Great Lakes Fishery Commission, the International Whaling Commission, the North Pacific Fur Seal Commission and the International North Pacific Fisheries Commission. The Board's widespread researches are carried out from five Biological Stations, two of which include oceanographic groups, and from three Technological Research Laboratories. Smaller stations and field establishments are maintained in places close to important operational areas.

BIOLOGICAL AND OCEANOGRAPHIC INVESTIGATIONS

The Board's main Biological Stations are situated at Nanaimo, B.C., London, Ont., St. Andrews, N.B., St. John's, Nfld., and Montreal, Que. The Nanaimo

and St. Andrews stations maintain associated oceanographic groups. A number of field stations and port observers stationed at key points are also maintained in the interest of operational efficiency.

Atlantic Fisheries—Newfoundland Area

Total landings of the principal commercial *groundfish* species were about four per cent higher than in 1962. Of these landings 79 per cent were cod, eight per cent redfish, eight per cent plaice, three per cent haddock, and two per cent greysole, halibut, wolffish, and pollock. Cod, redfish, and plaice landings were respectively four, 30, and 60 per cent higher and haddock landings 60 per cent lower than in 1962. The principal reason for the increase in landings of cod, redfish, and plaice is increased fishing effort for these species, whereas the low haddock landings are the result of decreased abundance.

In continued studies of the *inshore cod* fisheries of Newfoundland and Labrador, age and length compositions of samples reveal the dependence of traps and handlines upon the younger ages (4-7 years) whereas in the longline and gillnet fisheries cod of older ages (8 years and older) are important contributors to the catch when they are no longer being caught in large numbers by traps and handlines. In the Labrador area, cod of younger ages (4-6 years), which have contributed little to the catch in recent years, were present in abundance in 1963 and should contribute significantly to the success of the fishery for the next several years. In the annual shore survey for baby cod on the east coast of Newfoundland, designed to give useful predictions of the supply of young cod to the commercial fishery, the relatively small numbers of cod of the year which were caught suggest only moderate survival and settlement of the 1963 year-class.

In *offshore cod* surveys by the *A. T. Cameron* great concentrations of cod, being fished by a large fleet of European otter-trawlers, were located at 120-180 fathoms on the southeast edge of Hamilton Inlet Bank in April and May. These fish were generally small, with a high proportion of 4- and 6-year-old cod occurring in the catches. About 20,000 cod were tagged during the year with the especial purpose of studying the interrelationships of inshore and offshore cod populations.

Extensive surveys by research ships in May and July failed to find any concentrations of haddock, and the Newfoundland landings were low. The basic cause is the poor survival of young; the last successful year-classes were those of 1955-56 and a new abundant year-class is not yet in sight. Heavy exploitation also has contributed to the present haddock scarcity.

Redfish surveys off Labrador and eastern Newfoundland in the spring indicated a general trend in the distribution of redfish to deeper water in spring and presumably in winter. This is the time of the greatest concentration of redfish in the Labrador area. In this area in April the shallowest catch of commercial quantities of redfish was at 250 fathoms. In the Gulf of St. Lawrence there is little evidence of the presence of large fish but in some areas large numbers of young fish (seven years and younger) were caught. These fish began to be recruited to the fishery in 1963 but their potential had been recognized from research vessel catches 4 years earlier.

Lobster research in Port au Port Bay centred around studies on growth, spawning times, and fishing rates.

From a planting of 2.5 million *pink salmon* eggs in North Harbour River, St. Mary's Bay, hatching was highly successful and about 2.2 million fry passed down river between May 7 and June 16. The survivors are expected to return to the river in 1964. The experiments on Atlantic salmon in the Little Codroy River have been completed.

Atlantic Fisheries—Southern Area

Research at St. Andrews is carried out to provide knowledge for understanding and improving fisheries with special reference to the Maritimes.

Population studies on *lobsters* have been continued at key points so as to follow natural changes and the effects of fisheries regulations. At Port Maitland, lobsters showed more movements and greater natural mortality than expected from previous work. The economic possibility of growing small lobsters in captivity to more valuable sizes was explored as a step toward lobster culture. No immediate advances are indicated. The behaviour of free-swimming lobster larvae in relation to taking up life on the bottom was investigated. The possibility of using larval abundance to forecast catches was examined and holds promise of providing an acceptable basis for short-term prediction. A comprehensive bulletin on the care and handling of lobsters was prepared to assist the industry in applying results from 10 years of research.

The fate of free-swimming *oyster* larvae was routinely followed and the time of spatfall accurately forecast. In general, efforts to rehabilitate mainland oyster populations wiped out during the 1950's by Malpeque disease were found to be going satisfactorily. Examinations revealed no new spread of the disease. Satisfactory advances took place in co-operative work with other branches of government. An oyster hatchery has been built for co-operative use with the Fish Culture and Development Service of the Department of Fisheries. Studies by the Department of Mines and Technical Surveys of bottom sedimentation confirmed suspicions of heavy silting on oyster beds and the consequent deterioration of productive grounds.

Fishery statistics that truly represent conditions of the fish stocks and the fishing effort are essential in research, management, and long-term planning. In association with the Economics Service of the Department of Fisheries and the Dominion Bureau of Statistics, *catch and effort data* are compiled for national use and to meet international commitments through the International Commission for the Northwest Atlantic Fisheries.

Important *fishing grounds are surveyed* annually to provide information on the conditions of the stocks and a basis for predicting abundance. Observations were continued on the distribution and abundance of cod in the Gulf of St. Lawrence and of haddock on the Nova Scotian Banks. On the Nova Scotian Banks no major changes in cod abundance are evident. Poor recruitment is anticipated for haddock during the next several years. The proportion of fish discarded after being caught, determined in order to meet obligations under the International Commission for the Northwest Atlantic Fisheries, showed that conservation measures are generally effective. A study of the life history and population dynamics of the American plaice was concluded.

The *behaviour* of cod and other groundfish is being studied to provide a basis for designing more effective fishing gear. Attention is being given to the levels of

fatigue which can be sustained by fish without dying and to daily movements in relation to light intensity.

Catches of various *pelagic species* were sampled routinely and the conditions in the fisheries noted. Herring were sampled in the Bay of Fundy partly to meet international obligations. The spectacular upsurge in swordfish landings which accompanied introduction of longline fishing was fostered and followed by sea observations and shore sampling. New tuna enterprises based in New Brunswick are being followed and catches examined.

The *scallop* fishery is being studied by detailed analyses of catch statistics and observation trips at sea. Developmental stages of scallop larvae are being determined by laboratory rearing as a first step in studying factors influencing survival in nature. To assess the possibility of increasing the product from current catches, the wholesomeness is being examined of parts of scallops not now sold here but commonly used in other parts of the world.

As a preliminary step in having fishing gear designed specifically to recognize the behaviour of fish, *gear engineering* studies were begun to examine the forces on trawl nets while they are being towed.

Salmon populations in the Northwest Miramichi River and elsewhere are followed to detect natural changes in abundance and the effects of human interference in numerous ways including DDT spraying and mining pollution. In the Margaree River a major experiment is under way to determine whether the increase in smolt production resulting from control of merganser ducks is carried through to produce an increase in available adult salmon. Information collected at herring weirs about salmon post-smolts showed their sources and distribution in the Bay of Fundy. Seven tagged Miramichi salmon have been captured in Greenland and it seems that many fish of Canadian origin may be caught there. The behaviour of *salmon* and *trout* in fresh water is being studied to find out the best ways of assisting natural reproduction.

Mathematical studies are undertaken to promote efficient design of experiments and observational routines, and to assess the pertinence of accepted methods of estimating stock size.

Great emphasis is given to *oceanography* in its relation to fisheries. Water circulation was studied by drift bottles, electrical analogue models, induction effects, and dynamic heights. Temperature conditions in the sea are being monitored on routine cruises and at shore stations. Other properties of sea water such as optical properties and chemical contents are likely to have a bearing on fish life and investigations on them are being initiated. To provide a more detailed exploration a geochemical description of the Gulf of St. Lawrence was undertaken. Studies of invertebrates on the bottom in the Gulf of St. Lawrence are showing relationships with fish concentrations and bottom conditions.

Pacific Fisheries

The objective of the work of the Nanaimo Biological Station is to provide an appropriate background of research and investigation for the development of the marine resources of Canada's Pacific shores.

During 1963 the Station conducted many investigations largely related to the immediate national interest, providing scientific background for international

problems and service, investigation, and advice for management of fisheries in coastal waters. The *marine commercial fisheries* investigations continued to provide statistical analyses, predictions, and other management information on groundfish, herring, shrimps, and crabs. In addition to conducting population studies of local stocks (*near-seas* groundfish investigation), new studies were initiated in the Gulf of Alaska *(distant seas),* particularly on ocean perch. The *herring* investigations continued a monitoring of populations, co-operated in studies of the incidence of salmon in herring catches, and undertook trials of new mid-water trawl gear. Studies of the *scattering layer,* which is an important area of concentration of juvenile fishes and food organisms, were continued. *Crustacea* studies on local species continued, and explorations were made in various areas, including the Gulf of Alaska.

Investigation of *marine invertebrates* was largely devoted to service in the day-to-day problems of the shellfish industry. Studies on the effects of pulp-mill effluent on oysters, diseases of oysters, shellfish poisoning, abalones, razor clams, and wood borers, spread the investigation over a wide field of invertebrate problems.

Staff responsible for studies on *marine mammals* worked closely with the Department of Fisheries on management, as well as carrying a heavy load of international commitments relating to the International Convention for the Regulation of Whaling, and the International North Pacific Fur Seal Commission.

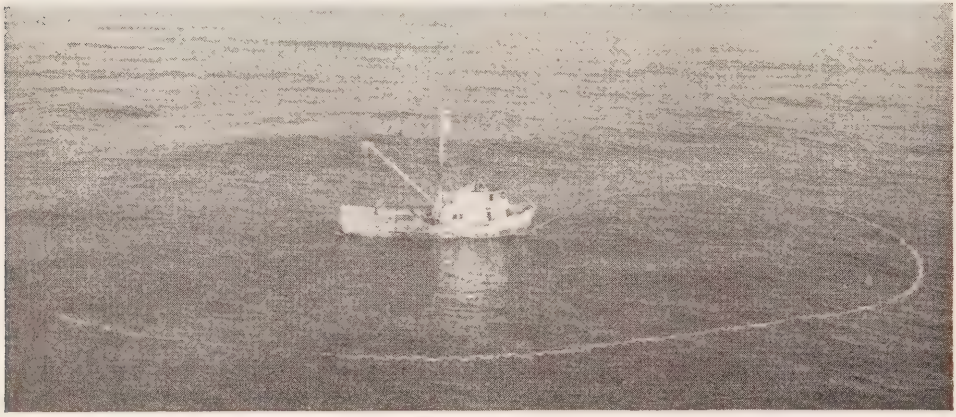
Similar service to management problems was a major feature of the work of the Station on Pacific salmon. The group working on *salmon stock assessment* provided a continuing appraisal of the status of salmon stocks, undertaking whenever necessary to provide assessments of problems of particular concern. An important contribution during 1963 was the part played by the Station in the production of a report concerned with pink salmon in the Strait of Georgia, under the auspices of the Pink Salmon Co-ordinating Committee appointed by the Governments of Canada and the United States.

A particularly large management-type of activity is embodied in the *Skeena River salmon* investigations, which support the participation of the Station in every aspect of Skeena salmon research management. All routine observations required for management were continued, including collection and analysis of commercial statistics, test fishing, escapement estimation, and sampling for age and size composition. Studies of sockeye at Babine Lake continued to provide information on growth and abundance of young from spawnings of known size and distribution. Pink salmon fry production (13 per cent survival) was estimated in the Lakelse River.

The investigations on *salmon propagation* and *lake sockeye,* though less concerned with matters of day-to-day management, are concerned with questions which have applicability to current work of the Fish Culture and Development Branch of the Department of Fisheries, and liaison with the Department is maintained at a good working level. The salmon propagation study at Lakelse is attempting an assessment of an artificial sockeye hatchery in conjunction with studies on critical aspects of early life-history biology. The lake sockeye studies on Babine Lake have encouraged the setting up of a "Babine Development Program" aimed at strategic location of artificial spawning channels to ensure better utilization of lake-rearing potentials. The work of Dr. W. Johnson and C. Groot

on the migrations of young sockeye was awarded a prize as paper-of-the-year in fish ecology and management, by the North American Wildlife Society.

The work on *early sea life of salmon* in Burke Channel has produced further valuable data on growth and mortality of young pink salmon, as well as estimates of total marine growth and survival. The latter findings are particularly signifi-



Purse seiner off the British Columbia coast.

cant to international problems, supporting the view that high-seas fishing for pink salmon is less productive of total yield than shore-based fisheries on mature fish.

Stream ecology studies, largely concerned with underyearling coho salmon at Chef Creek, Vancouver Island, confirmed and extended previous work. Production of young coho is at a rate of 50 pounds per surface acre and is enhanced by small pools in the system.

During 1963 *chinook and coho salmon* studies were re-established to provide information apropos of new problems arising from sport fishing and the international aspects of the fisheries for these species. In addition, this investigation will undertake the Canadian commitment for participation in the program for evaluation of Columbia River hatcheries for chinook salmon.

Pollution investigations were, to a very large extent, concerned with monitoring existing marine pollutions and with research aimed at answering specific applied questions posed by the complex chemistry of pulp-mill effluents. This investigation has been considerably overworked, with the expanding pollution problem on the Pacific Coast.

Tolerance studies provided consultation and bioassay services for the Department of Fisheries. The more fundamental aspects of this work were concerned with the difficult problems of bioassay technique — another field of potentially important application.

Physiology and *behaviour* investigations continued to provide valuable understanding basic to evaluation of situations created by man-made obstructions such as power dams and water diversions. Appreciation of effects of these kinds of developments has greatly increased, and is proving valuable in planning adequate protection for salmon in proposed projects. Work on respiratory meta-

bolism has been summarized in a comprehensive publication. Studies of behaviour have been chiefly concerned with the mechanisms of migration and navigation.

As in previous years, the Station has been heavily committed to conduct research related to the problems before the International North Pacific Fisheries Commission (INPFC). The investigation concerned with *salmon on the high seas* was perhaps most directly involved, and their large expenditures on fishing for salmon far offshore are an indication of the work being done. In 1963, extensive tagging in the Gulf of Alaska confirmed the general picture of distribution of North American salmon stocks in the eastern part of the North Pacific, allaying concern that Japanese high-seas fishing was taking large numbers of salmon of Canadian origin. Other investigations have been involved, and though not engaged in extensive field work, were nevertheless committed to large expenditures of time in the preparation of INPFC reports. Much of the work of the *parasitism and disease* investigation for the past decade has been concerned with techniques of stock identification by parasite loads. A comprehensive publication concerning the parasites of salmon in the North Pacific was completed. Studies have continued on the biology of many parasites which may prove of significance. The herring group in early 1964 began an investigation of Queen Charlotte Island herring stocks — an investigation considered desirable in view of the recent release of these stocks from abstention. Scientists engaged in *salmon stock assessments* have been called on to prepare arguments documenting the Canadian viewpoint that salmon should not be harvested on the high seas, and are at present being rationally exploited to their biological capacity. Similarly, staff working on *marine commercial fisheries* participated in the documentation of the case for abstention for halibut and herring.

The *Pacific Oceanographic Group* has also been involved in INPFC activities, invaluably contributing to the collection, synthesis, and presentation of the oceanographic material as background to understanding of North Pacific fisheries problems. The general program of the POG covers a wide range of oceanographic researches, reflecting that the group currently undertakes the Canadian requirements in oceanography on the Pacific. The projects in 1963 included continued monitoring at Ocean Station "P", daily seawater observations at 15 stations, study of physical oceanography of Dixon Entrance, assessment of coastal structure, publication of weekly charts for the Canadian Oceanographic Information Service, development of the airborne radiation thermometer, collaboration (with Scripps Institution of Oceanography) in publication of mean monthly OCEAN charts, definition of models of temperature and salinity structure for the North Pacific, studies of the intermediate water in the subtropical Pacific, and collaboration with the early-sea-life-of-salmon group on oceanography and pink salmon migration in Burke Channel.

An important new development in the Pacific Oceanographic Group has been a reorientation in the first part of 1964 to new objectives in *fisheries oceanography and marine ecology*. A program has been established, to work in cooperation with existing fisheries investigations, to assess the existing state of knowledge of the environment and fisheries, to derive correlations where possible, to define what information is lacking and how it may be obtained, and to provide systems of monitoring the environment that will aid assessment of the fisheries. Some transfers of staff have been effected in the Station as a whole, and further

developments in this area will be reported in 1964-65 as the program gains in momentum.

Inland Fisheries

The *population study* at Heming Lake has produced evidence that in the course of several years a surprisingly large proportion of tagged fish lose their tags, even when carefully applied. Evidence continues to accumulate that a program to control the parasite *Triaenophorus crassus* in Heming Lake, which terminated in 1960, succeeded in eliminating the pest completely; apparently it has not become re-established. A study of the *Great Slave Lake* fishery is now almost completed and preparations for reporting on results are almost completed. In *Lake Superior,* the Canadian catch of lake trout again increased as did average size of individual fish and catch per net. These are encouraging signs of improvement in the condition of the lake trout population, an improvement attributed to a recent sharp decline in sea lamprey abundance.

The Board again acted as Canadian agent for the Great Lakes Fishery Commission with respect to a program designed to control landlocked *sea lampreys.* The Commission's 1963 program required chemical treatment of 15 Lake Superior streams, and surveys on 630 streams in the Great Lakes watershed. In 1963, as in 1962, counts of spawning-run sea lampreys were much lower than counts for several years prior to 1962. Apparently there has been a dramatic decrease in lamprey abundance as a result of control efforts.

Arctic Fisheries

An aquatic biological survey of *Great Bear Lake,* devoted principally to limnology in its initial year, found primary production to be generally very low with a maximum occurring in the shallowest southern arm. Fish abundance paralleled primary production findings.

Catch per unit of effort of *char* in Frobisher Bay continued to decline and results indicated the fishery continued, in part, on the accrued capital stocks. An investigation carried out on a land-locked population on Victoria Island suggested that a useful untouched resource exists in the many small lakes of this area.

The feasibility of a fishery on the west coast of *James Bay* was investigated and found unprofitable, while western coastal arctic fishery exploration found Greenland cod to be abundant and worth further study.

Life-history studies of the *narwhal* were started in the Pond Inlet area, and sampling and censusing of the *white whale* population of the Churchill area was completed.

Aerial censusing of moulting and breeding *harp seals* and breeding *grey seals* was carried out, and young harp and grey seals were tagged and/or branded in order to determine exploitation rates and migration patterns.

Planktonic studies to determine arctic water masses and currents were carried out and the Station actively participated in an international program designed to study the drift of fish larvae and eggs in relation to plankton distribution and hydrographic conditions on west Greenland waters.

TECHNOLOGICAL INVESTIGATIONS

The Board's integrated technological research program for the Atlantic coast is carried out in laboratories located at Halifax, N.S., Grande-Riviere, Que., and St. John's, Nfld. Technological investigations on freshwater fish are centered at London, Ont., and are co-ordinated with those concerning Pacific coast fisheries which are conducted at the Board's research laboratory in Vancouver, B.C.

Atlantic Coast

The co-ordination of technological research in the Atlantic Provinces has been completed by linking the program of the Grande-Riviere Technological Station with that of the Newfoundland Technological Unit and the Halifax Technological Research Laboratory to form the Atlantic Technological Research Program.

A commonly employed diet for commercially pounded *lobsters* has been shown to be little better than starvation in maintaining lobster blood cell counts at the level found in a natural environment. Supplementation of the diet with liver corrected this situation. The tolerance of lobsters to various woods and fluoridated water has been assessed. Western cedar is extremely toxic and should not be used for construction of pounds.

A diluting *media* for salmon sperm has been found which does not cause inactivation during the process of incorporating glycerol in the cell. This is a prerequisite to successful freezing of the sperm.

Malpeque resistant *oyster* stocks have been shown by serological tests to possess an antigen which is absent in susceptible Cape Breton oysters, but it is still to be determined whether this is associated with resistance.

Dimethyl sulphide has been identified as a the substance responsible for the off-odour of fillets from *Labrador cod* feeding on the pteropod *Limicina helicina* ("blackberry").

Sample thickness is indicated to be an important variable in determining texture characteristics of *freeze-dried cod*. A mascerated muscle residue from commercial filleting operations in Newfoundland has been shown to produce a freeze-dried product with much better texture than similar products prepared from fillets.

Very low dose *radiation pasteurization* of haddock and scallop meat has resulted in products with excellent storage characteristics in ice.

Fish protein concentrate (flour) has been prepared from filleting scraps and whole fish and the process has been modified for application to oily species such as herring. Nutritional and aesthetic characteristics of all products have been very good.

Considerable progress has been made towards defining the influence of *physiological and environmental factors* on quality and shelf-life of fishery products, particularly in the studies on Newfoundland trap cod non-bacterial deterioration of groundfish.

Pacific Coast and Inland

In former years research and its logical development in these laboratories has resulted in large scale applications of the findings in the fishing industry. In

keeping with these previous successes the present year has seen significant progress in devising novel *equipment* for unloading comparatively large fish, such as salmon, by either the air-lift principle or by employing an ingenious device using alternate suction and pressure cycles. Useful applications of existing knowledge have been made in the engineering of refrigeration systems on vessels, which may engage in tuna or halibut freezing at sea, in use of a vacuum principle in tuna canning, and in bulk handling of herring meal.

Previous *general investigations* which have been continued or modified with new objectives include: attempts to prevent "belly-burn" in non-eviscerated salmon by holding them in sea water at about 25°F; studies on development of oxidative and hydrolytic rancidity and its significance and control in frozen fish; the value of tetracycline antibiotics in shrimp preservation; control of drip formation in thawed fish; and the effect of sugar removal on browning of heated fish flesh.

Much research effort has been expended on *biochemical problems* associated with live fish. Thus significant progress has been made in elucidating the nature of food and home stream odour attractants for salmonid fish, in the assay and purification of salmon pituitary gland hormones, and in investigations of the post-spawning survival of Pacific salmon. A number of modified techniques have been applied to separation of certain of the muscle, blood, and serum proteins of fish, and there is now no doubt that this method will prove an invaluable addition to existing methods of fish classification. Several fish enzymes have been studied with respect to their ability to form rare chemical compounds, and basic chemical studies have been made of novel marine invertebrate and fish nucleic acids and nucleotides.

In the *London laboratory,* progress has been made in implementing new programs concerned with improvement in quality of lake fish and the possible use of rapid spray chilling as one means of effecting this. Research on speciation of fresh water fish by use of protein patterns has been initiated.

Further details of the above and other investigations by the Board's various establishments can be found in the Board's Annual report, published separately.

RESEARCH VESSELS

A fleet of 17 vessels, in addition to a research barge, the *Velella,* was maintained by the Board during 1963 for investigations off the Pacific and Atlantic coasts as well as on inland and arctic waters. Its makeup was as follows:

Name	Tonnage	Length	Crew
St. John's Nfld.—			
A. T. Cameron	330	177.5′	25
Investigator II	52	78.4′	9
Marinus	35	58.5′	6
Parr	18	44.4′	2

Name	Tonnage	Length	Crew
St. Andrews, N.B.—			
Harengus	48	77.6′	9
Mallotus	13	53.8′	4
Pandalus II	20	46.3′	3
Clupea	11	30.2′	1
Montreal, P.Q. (Arctic Unit)			
Calanus	5	47′	2
Salvelinus	13	35′	—
London, Ont.—			
Cottus (Great Lakes)	10	41.9′	2
Stenodus (Great Slave Lake)	10	42.8′	2
Nanaimo, B.C.—			
G. B. Reed	363	177′	25
A. P. Knight	78	72.5′	6
Investigator I	36	54.3′	4
Alta	13	38.9′	2
Noctiluca	8	30.1′	1

INTERNATIONAL COMMISSIONS

THE NEED for sound conservation practices in the management of fishery resources has become more and more apparent during the past few years, each year bringing new evidence of the possibility of overfishing. The responsibility of the Department of Fisheries is to encourage the maximum possible exploitation of Canada's fishery resources under principles of management which have been developed from results of scientific investigations. Canada, however, shares certain resources with other countries, so that international co-operation is imperative if such marine resources are to be managed efficiently for the benefit of all nations.

This co-operation has been made possible in certain areas by the creation of international commissions whose work during 1963 is reviewed in the following pages. Canada is represented on seven such commissions, which co-ordinate scientific investigations and recommend management procedures to member governments. Of the seven, four are multilateral agreements and deal with the fisheries of the Northwest Atlantic Ocean, the fisheries of the North Pacific, the stocks of fur seals, and of whales. The other three are bilateral, between Canada and the United States, and deal with Pacific sockeye and pink salmon of the Fraser River system, the halibut of the North Pacific Ocean, and the fisheries of the Great Lakes.

INTERNATIONAL PACIFIC SALMON FISHERIES COMMISSION

The Fraser River, which drains 90,000 square miles, a quarter of the area of British Columbia, supports very large stocks of Pacific salmon. As mature fish, returning to the river from the sea, these stocks pass through the territorial waters of both Canada and the United States where large numbers of fish are taken by the fishermen of those countries. Further catches are made by Canadian fishermen in the lower reaches of the river.

The sockeye salmon has always been the most valuable run to the Fraser and an extensive fishery and canning industry was already based on this species before the turn of the century. Production increased rapidly and reached a peak in 1913 when 115 million pounds of sockeye were packed. However in this year a rock slide, precipitated by railroad construction, blocked the upstream migration of almost the entire run in the Fraser Canyon and very few fish succeeded in reaching the upriver spawning areas. As a result of this catastrophe and the continuing intensive fishery, catches in subsequent years declined to almost negligible proportions. It soon became apparent that some form of extensive remedial action was required to rehabilitate the runs and since these runs were of considerable economic importance to both countries a Convention was signed by Canada and the United States in 1937 with the aims of preserving, protecting and extending the sockeye salmon fisheries of the Fraser River. To these ends the Convention established the International Pacific Salmon Fisheries Commission

consisting of three members from each country and a technical and administrative staff based at New Westminster near the mouth of the Fraser. On the approval of the two governments, costs of investigations and capital expenditures are shared equally by Canada and the United States.

After a period of intensive study and assessment of the sockeye salmon stocks of the Fraser River, the Commission, in 1945, constructed large fishways in the Fraser Canyon at a cost of one million dollars. In subsequent years an additional million dollars has been expended to remove further obstructions to the upriver migration of sockeye in this and other sections of the river system. Concurrently with this program of extensive stream improvement, the fishery was rationalized

Gill net fishing boat leaving San Juan harbour, B.C.

and controlled to ensure, as nearly as possible, that adequate numbers of fish escaped to each of the spawning areas and that the catch was equally shared by fishermen of both countries. Although many fundamental problems remain, these and other measures have resulted in very substantial increases in sockeye production.

In 1957, following a decade of highly competitive and dangerously intensive fishing for Fraser River pink salmon, the two countries further agreed to include

this species in the Convention. Since then the Commission has conducted extensive studies of pink salmon and has brought the fishery under rational control. Due to a variety of natural causes, the pink salmon of the Fraser are presently low in abundance but there is every reason to expect the runs to increase very substantially in future years.

In 1963, the Fraser River sockeye run entering the Convention area totalled 3,790,000 fish, the second largest of this cycle year since 1903. Of the total catch of 2,001,000 fish, 1,314,000 were taken by United States fishermen. As the result of an extended early-season price dispute and consequent tie-up of the Canadian fleet, Canada's share of the catch totalled only 687,000 sockeye. Because the major portion of the run was earlier than usual and passed through the fishery during the Canadian fleet tie-up, a very large escapement of 1,600,000 fish reached the spawning areas. Apparently as a result of the unusually early arrival combined with high water temperature, large numbers of spawners in some areas and the prevalence of a bacterial disease *(Columnaris),* over a million sockeye died unspawned. To grapple with this most serious problem the Commission is undertaking an exhaustive study of the relationships between pre-spawning mortality, water temperature, arrival time and population density.

Other current studies concerning sockeye include experiments aimed at understanding and improving methods of artificial propagation and assessing the effects of pulp mill wastes on both upstream and downstream migrants.

The 1963 pink salmon run entering the Convention area totalled 16,100,000 fish of which 10,300,000 were estimated to be of United States origin, 4,500,000 of Fraser River origin and 1,300,000 of non-Fraser Canadian origin. The total Convention waters catch of 8,600,000 pink salmon was over eight times larger than that of the brood year and was the largest since 1955. Special problems were encountered in managing the fishery to ensure an adequate catch of the phenomenal run to United States streams while at the same time ensuring a reasonable escapement of the smaller Fraser River run and providing for equal division between United States and Canadian fishermen. Of the Fraser River run 1,953,000 pinks or 43 per cent escaped to the spawning areas. The early run escapement of 973,000, while higher than that of the two previous cycle years, was still far below the number which could be accommodated on the spawning grounds. The late run escapement of 980,000 was the largest since 1957 when enumeration was started and was probably adequate for the spawning areas involved.

Twenty-one formal meetings were held by the Commission in 1963 and included meetings with the State and Interior Departments and the Bureau of the Budget in Washington, D.C., and with the Department of Fisheries in Ottawa. Canadian members of the Commission were Senator Thomas Reid, W. R. Hourston, Pacific Area Director of Fisheries and A. J. Whitmore.

INTERNATIONAL PACIFIC HALIBUT COMMISSION

The year 1963 was the 40th anniversary of the signing of the first treaty between Canada and the United States for the preservation and development of the Pacific halibut fishery. After ratification in 1924 the International Fisheries Commission, established under the treaty, initiated a comprehensive scientific

investigation of the declining fishery. It was soon evident that winter closure provided by the treaty was largely ineffective in reducing the fishing rate.

Regulatory authority was provided by the treaties of 1930, 1937 and 1953 to divide the coast into areas, to control the fishing rate by catch limits or by adjusting the length of the closed season in each area and to apply size limits. The 1953 treaty, which provided the present name for the Commission, requires that the stocks be developed to and maintained at levels of maximum sustained yield.

During 33 years of management the halibut population trebled in size and the annual catch, which had declined to 44,000,000 pounds by 1931, the year before regulations, was successively increased to a record high in 1962 of 75,100,000 pounds. In 1963, due to deficits in catch limits, the total declined to 71,200,000 pounds though the Canadian catch of 37,000,000 pounds was a record high and a five-fold increase over 1931.

The 39th Annual Meeting at Petersburg, January 28 to 31, 1963, was the first such meeting held in Alaska. After conferring with the industry and reviewing the scientific findings, the 1963 regulations were drafted and became effective on March 21 on approval of the Governor General in Council of Canada and the President of the United States of America.

The regulations were subsequently modified. The International North Pacific Fisheries Commission in October 1962 had recommended that the halibut in Bering Sea be removed from abstention by Japan. Pending approval by the governments the North Pacific Commission in February 1963 agreed to conservation measures for eastern Bering Sea. By May 8 the recommended removal from abstention had been ratified by all three governments, and the Halibut Commission incorporated the above conservation measures in revised regulations which were approved and became effective on June 8, 1963.

The regulatory areas in 1963 were: Area 1—south of Willapa Bay; Area 2—Willapa Bay to Cape Spencer; Area 3A—Cape Spencer to Shumagin Islands; and Area 3B south—Shumagin Islands and west, not including Bering Sea. The eastern Bering Sea was divided into Area 3B North Triangle which included the edge grounds between Unimak Pass and the Pribilof Islands, and the remainder which continued as Area 3B North.

Catch limits in 1963 for Areas 2, 3A and 3B North Triangle were 28,000,000 and 34,000,000 pounds, a 1,000,000 increase over 1963, and 11,000,000 pounds respectively, the latter a three-nation total as recommended by the North Pacific Commission. Catches in other areas were controlled by length of seasons.

Areas 1 and 2 with catches of 210,000 and 25,800,000 pounds respectively opened May 9 and closed November 30, the statutory closing date since the catch limit for Area 2 was not attained. Area 3A opened May 9 and closed August 9 with a catch of 33,400,000 pounds. Areas 3B North and 3B North Triangle opened March 25 and closed October 15 with Canadian and United States catches of 7,300,000 and 844,000 pounds respectively. Area 3B South opened April 19 and closed October 15 with 3,900,000 pounds caught.

The catch per unit effort in Area 2 in 1963 continued to decline. A moderate increase off British Columbia was more than offset by declines off Southeastern Alaska. In Areas 3A and 3B South the catch per unit effort declined slightly from 1962.

In Area 3B North Triangle the catch per unit effort continued to decline at an accelerated rate. This along with the increasing dependence on young halibut suggest that the 6.8 and 7.3 million pounds caught in 1962 and 1963 respectively, not including the 3.6 million pounds caught by Japan in 1963, probably exceeded the continuable annual yield for the region. In Area 3B North the fishery is still in the exploratory stage but is not believed to include as productive grounds as did Area 3B North Triangle.

To investigate the composition of the catch a record 287 commercial trips were sampled in 1963 with 110,000 fish measured and ages obtained from 37,000 otoliths. In Area 2 the catches are still unduly dependent upon fish under 10 years of age. In Areas 3A and 3B South a satisfactory age composition is being maintained. In Area 3B North Triangle only 20 per cent of the weight of the catch is from fish older than 12 years compared to over 30 per cent on the long-fished grounds in Area 3A. This very low percentage of older fish in Bering Sea reflects the recent intensive fishing.

Tagging studies that provide information regarding the relationships between stocks and the extent of their utilization involved the charter of three vessels for a total of 269 days in 1963, the most intensive tagging activity in the history of the Commission. It included grid tagging in Area 3A, tagging young halibut on the Bering Sea flats, and winter tagging on the Bering Sea edge.

Nearly 11,000 halibut have been tagged in Bering Sea since 1956, indicative of the intensity of the research by the Commission in the region.

To provide advance information of the recruitment into the commercial fishery, studies of the abundance of young halibut were continued in 1963. Over 6100 young halibut were taken in 176 hauls by a chartered trawler at the regular sampling stations between Dixon Entrance and Shumagin Islands. In 1963 emphasis was placed on the offshore grounds to detect possible changes in the juvenile population due to foreign trawling.

The trawl survey that had been commenced in May 1961 was completed by March 1963 and a preliminary report made thereon. A report upon the regulation of the fishery and investigations during 1962 was published and a number of memoranda reports were prepared.

The Canadian Commissioners in 1963 were Dr. William M. Sprules, Chairman, Ottawa; Harold S. Helland, Prince Rupert (who was succeeded during the year by Martin K. Eriksen of Prince Rupert); and Richard Nelson, Vancouver. The United States Commissioners were Harold E. Crowther, Vice Chairman, Washington, D.C.; Mattias Madsen, Seattle; and William A. Bates, Ketchikan.

Henry A. Dunlop, Director and Secretary, retired on July 8, 1963, and F. Heward Bell, Assistant Director, was named his successor.

INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION

On June 12, 1953, the Governments of Canada, Japan and the United States established the International North Pacific Fisheries Commission and charged it with developing recommendations for the conservation of the high seas fisheries resources of the North Pacific Ocean. The treaty has a guaranteed minimum life of ten years and thereafter until one year from the date on which any mem-

ber country gives notice of termination. Four commissioners represent each of the member countries. Headquarters are in Vancouver, British Columbia.

No member country has yet given notice of intent to terminate the treaty, although the date after which notice can be given has now been passed. However, at the instigation of Japan, two rounds of negotiations toward a new North Pacific fisheries treaty took place among the three Contracting Parties during 1963. Although progress was made an agreement was not reached, and further negotiations will be held.

Early in February 1963, members of the Commission assembled in Tokyo to hold an interim meeting to develop recommendations for tri-nation conservation measures for halibut in the eastern Bering Sea. During the course of this meeting, the commissioners were shocked and saddened by the sudden death of their chairman, George R. Clark.

During the course of this interim meeting the Commission developed recommendations for conservation measures for the halibut stocks of the eastern Bering Sea. Such measures were required if and when the Contracting Parties accepted the Commission's recommendation (made at the 1962 annual meeting) that the stock be removed from the list of those under abstention by Japan. In essence, the conservation recommendations provided that the season would open on March 25 in a small area of the eastern Bering Sea referred to as the Bering Sea "Triangle". Fishermen of the member countries were allowed to take halibut only by means of longlines. A quota of 11,000,000 pounds was set for the season. If the quota was not attained earlier, the season would automatically close on October 15. Details of the conservation recommendations may be obtained from the 1963 Annual Report of the Commission.

On May 8, 1963, the Government of Canada approved the Commission's recommendations for removal of halibut of the eastern Bering Sea and herring off the west coast of the Queen Charlotte Islands from the list of stocks under abstention by Japan. Since the United States and Japan had earlier approved these recommendations, they came into force on May 8. The conservation recommendations for eastern Bering Sea halibut recommended by the Commission also came into force on May 8. Although Japanese fishermen were no longer required to abstain from fishing herring on the high seas west of the Queen Charlotte Islands, they undertook no such fishery in 1963.

In the Bering Sea triangle during 1963, a total catch of 10,944,000 pounds (dressed, heads off) had been attained by the time the season closed on October 15, 1963. Canadian fishermen took 4,058,000 pounds, Japanese fishermen 3,670,000 pounds and United States fishermen 3,216,000 pounds of this total.

The 1963 Annual Meeting of the Commission was held in Vancouver under the chairmanship of Dr. A. W. H. Needler, Deputy Minister of Fisheries for Canada, who succeeded the late Mr. Clark. Preliminary sessions of committees were held beginning on November 4 and plenary sessions occupied the week of November 18 to 23. The opening session was addressed by the Honourable H. J. Robichaud, Minister of Fisheries of Canada. Approximately 105 persons took part in the sessions.

The Commission reviewed the status of the various stocks currently under abstention and recommended no changes. This means that during 1964 Japan is required to continue to abstain from fishing halibut and salmon in the North

Pacific Ocean east of 175° West Longitude and herring off the coast of British Columbia, exclusive of the area west of the Queen Charlotte Islands. Canada and Japan will both abstain from fishing for salmon of United States origin in the eastern Bering Sea.

The Protocol to the Convention provides that Japan will not fish for salmon on the high seas west of a line located on or near 175° West Longitude until the Commission decides, as a result of findings from its research program, to recommend that the line be moved. The purpose of the line is to best divide salmon of North American origin, which Japan has agreed not to fish, from salmon of Asian origin. Several years ago the Commission found it could not agree on the intent of the Protocol to the Convention and asked the Contracting Parties to provide it with an agreed interpretation of the Protocol. Since no such agreed interpretation has been forthcoming from the Contracting Parties, the Commission again decided, at its 1963 Annual Meeting, that it could not act on the Protocol requirement. In other words, it could not decide whether the line should be confirmed in its present location or moved to the east or to the west, since it had no agreed basis on which to apply the results of its research. The result is that the line remains where it is.

At its 1963 Annual Meeting the Commission agreed on recommendations for measures for the conservation of halibut in the eastern Bering Sea in 1964. These recommendations were essentially the same as those for 1963, except that the quota was reduced to 6,393,340 pounds (2900 metric tons). Details may be found in the annual report of the Commission for 1963.

Each year the Commission sponsors one of the world's largest programs of fisheries research on the high seas. The program is executed by the established fisheries research organizations of the Contracting Parties. In 1963, as it has each year since 1955, the Commission continued investigations into the abundance, origin, distribution and intermingling of continental stocks of Pacific salmon on the high seas. In addition, it continued studies of the king crab stocks of the eastern Bering Sea, to determine if joint conservation measures should be recommended and began collection of data and planning of research on the groundfish stocks of the eastern Bering Sea and the eastern North Pacific Ocean.

The Commission continued vigorously to publish the results of its research program, in English and Japanese. The English publications included the first two volumes of a projected nine-volume series entitled "Salmon of the North Pacific Ocean". Part I contains the introduction and historical catch statistics and Part II contains a review of the oceanography of the Subarctic Pacific region, the zone in which salmon spend their ocean life. Further volumes are in advanced stages of preparation and all should be published within the next two years.

After having reviewed the results of its program of king crab research in the eastern Bering Sea, the Commission was informed that although fishing had increased greatly, research had not progressed to a point where recommendations concerning joint conservation measures might be made. On this basis, the members of the Commission took no action toward recommendation of conservation measures for king crab of the eastern Bering Sea.

As it has in the past several years, the Commission adopted a resolution asking for full consideration of the conservation needs of the salmon resources in the "area of common concern" when fishing regulations are prepared by the

member governments for future fishing operations in this area. The "area of common concern" is that in which salmon from the two continents intermingle.

During 1963, Japanese trawling vessels began operations for groundfish other than halibut (which remain under abstention) in the area south of the Aleutian Islands and in the Gulf of Alaska. A small number of trawlers was involved and scientific observers from Canada and the United States were aboard each of the vessels to assist in studying the effects of these trawl fisheries on the halibut stocks. The complex findings of these studies cannot be summarized here. As an illustration, in the Albatross Bank area, incidental halibut catches amounted to about 2% in shrimp trawls and 0.9% in groundfish trawls. In sunken gillnet catches, halibut averaged 0.1% of the total catch from the areas fished.

In 1964 the Commission's research program on the high seas will be essentially similar to that of the past years. Emphasis will be given to the preparation of reports on results of research to date. Studies of the oceanography of the salmon waters of the North Pacific and studies of the distribution and movement of salmon on the high seas will be continued. Work on identification of the continental origin of salmon taken on the high seas will be continued and preliminary field work will be undertaken on studies of the ocean growth and mortality of salmon. Tagging of salmon on the high seas will be an important adjunct of studies of migration.

It will be noted that in 1963 the North Pacific Commission has greatly increased its concern with halibut and other groundfish of the North Pacific Ocean. In these endeavours it has had the constant assistance and advice of the members and staff of the International Pacific Halibut Commission. This co-operation has been of great value in dealing with these difficult matters, which involve a degree of overlapping responsibility.

At the beginning of 1963 the chairman of the Commission was the late George R. Clark of Canada. He was succeeded by Dr. A. W. H. Needler. The other Canadian commissioners were John M. Buchanan, James C. Cameron and Roger T. Hager, who was succeeded during the year by Carl E. Giske. The vice-chairman of the Commission was Iwao Fujita of Japan and the secretary was Edward W. Allen of the United States. New officers for 1964 were as follows: Chairman, Iwao Fujita of Japan; vice-chairman, Fred P. McGinnis of the United States; secretary, Dr. A. W. H. Needler of Canada. The executive director of the Commission's staff was Roy I. Jackson and the assistant director was Dr. Hiroshi Kasahara, later succeeded by Dr. Fukuzo Nagasaki. The 1964 Annual Meeting of the Commission will be held in Tokyo, Japan. The first plenary session will begin on November 16, 1964, and will be preceded by committee sessions beginning on October 26.

INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

Under the terms of a Convention signed in 1949, the International Commission for the Northwest Atlantic Fisheries is responsible for promoting and co-ordinating scientific studies on the stocks of the species of fish which support international fisheries in the Northwest Atlantic. Based on these researches, the

Commission recommends measures to keep these stocks at a level permitting the maximum sustained catch.

The Commission has five Panels, each one reviewing the status of and recommending proposals for the fisheries in a geographic subarea of the Convention Area. Panel 1 administers the fisheries in the subarea off West Greenland (Subarea 1), Panel 2 the subarea off Labrador (Subarea 2), Panel 3 the south and east of Newfoundland and on the Grand Banks (Subarea 3), Panel 4 the Gulf of St. Lawrence and Nova Scotia Banks (Subarea 4) and Panel 5 the Gulf of Maine and Georges Bank (Subarea 5).

The governments sharing these conservation interests are those of Canada, Denmark, France, Federal Republic of Germany, Iceland, Italy, Norway, Poland, Portugal, Spain, USSR, United Kingdom and USA. Offices of the Commission's headquarters are located in the Bedford Institute of Oceanography, Dartmouth, Nova Scotia.

Based on research, minimum mesh-size regulations for the trawl fisheries for cod and haddock have been adopted in Subareas 4 and 5 (4-½ inch) and Subarea 3 (4-inch). Proposals to adopt a 4-½ inch mesh for all subareas and to make illegal the use of any top-side cover that would obstruct or diminish the size of the meshes of the trawl's codend are before member governments for approval.

Concern for the expanding offshore fisheries for the non-regulated species, herring, scallops, whiting (silver hake), tuna, swordfish and sharks, has prompted new studies on the effect of the fisheries on the stocks of these fish. In addition, a protocol allowing the Commission to conduct studies leading to sound management practices for the harp and hood seal fisheries should soon become effective.

The year 1963 saw the culmination of several major projects and the initiation of new lines of co-ordinated research. The ICNAF Survey NORWESTLANT 1-3, to establish the drift of cod eggs and larvae and redfish larvae in relation to environmental conditions during April-June, was completed and plans for analysis and publication of the data are well advanced. The ICNAF Symposium on the influence of the environment on the principal commercial fish stocks of the North Atlantic will be held at FAO, Rome, 27 January-1 February. With almost 90 scientific contributions available for discussion and the likelihood of 70 scientists in attendance from North America and Europe, the meeting promises to give valuable guidance to future research efforts.

The 13th Annual Meeting of the Commission was held in Halifax, June 3-7, 1963, preceded by meetings of scientific bodies. The Commission recorded its great sorrow and loss in the death of G. R. Clark, Chairman of the Commission and Deputy Minister of Fisheries for Canada. As a first step in introducing international enforcement of ICNAF regulations, the Commission agreed to seek amendments to the Convention authorizing it to make proposals for national and international measures of control in the Convention Area. Member countries agreed that there should be an exchange of information on fishing customs and navigational practices by fishing fleets in the Convention Area in order to draw attention to the problems created by the variety of fishing procedures.

A most important item for resolution at the 1964 Annual Meeting scheduled for Hamburg, June 1-6, was the proposal to adopt the minimum mesh-size regulation in force in the Northeast Atlantic, thus providing for a standard mesh

regulation for the whole North Atlantic. The Commission was to consider the effect of the rapidly increasing amount of fishing in the Convention Area and the interpretation of the Commission's objective of the maintenance of the maximum sustained catch.

At the 1963 Annual Meeting, Klaus Sunnanaa of Norway was elected Chairman of the Commission replacing G. R. Clark. Frank P. Briggs of the United States was elected Vice-Chairman. Canadian Commissioners are W. C. MacKenzie, Department of Fisheries, Ottawa, J. H. MacKichan, Halifax, Nova Scotia, also Chairman of the Commission's Standing Committee on Finance and Administration, and P. P. Russell, St. John's, Newfoundland.

GREAT LAKES FISHERY COMMISSION

The welfare of the fisheries in the Great Lakes has concerned Canada and the United States for almost a century. International commissions or boards have been appointed from time to time to study the condition of the fishery and make recommendations to the two governments. Continuing and intensified problems of conservation and the increasingly severe depredations by sea lampreys after 1945 led to the ratification of the Convention on Great Lakes Fisheries in 1955 and establishment of the Great Lakes Fishery Commission.

Fisheries in the upper Great Lakes were in a seriously depressed condition when the Commission was established, due mainly to the drastic reduction in preferred species by sea lampreys. Fisheries in the lower lakes, although experiencing some difficulties, were continuing to produce at about normal levels. The Commission, therefore, directed its attention to control of the sea lamprey. The program, which is planned by the Commission, is carried out under contract by the United States Bureau of Commercial Fisheries and the Fisheries Research Board of Canada.

In 1957, chemicals were used for the first time to destroy young lamprey in streams during their larval life, and by 1960 this procedure had replaced electrical barriers as the principal method used to control the parasite. Some barriers are still operated to follow changes in lamprey abundance and thereby measure the effect of chemical treatments on the adult population.

The chemical treatment program began in Lake Superior in 1958 and by 1961, 71 of the 110 streams now known to produce sea lamprey had been treated. The effects of these treatments were evident in 1962 when the barrier catches of adult lamprey dropped to 20 per cent of the average catch for the preceding five years. The 1963 catch increased slightly to 23 per cent. Treatments have been continued in Lake Superior as surveys located additional lamprey streams. Fifteen streams were treated for the first time in 1963 and 23 streams were treated a second time to destroy young lamprey which had either survived the initial treatment or had become re-established afterwards. Re-treatments are generally made every four years to minimize contributions of re-established populations.

The reduction in lamprey in Lake Superior was followed by an increase in the abundance of older lake trout, but young fish, spawned naturally, remain scarce. In some areas young fish are almost all from stock planted to bolster natural reproduction. In 1962 the fishery in the United States was closed, on the

Commission's recommendation that the harvest of lake trout in Lake Superior be limited to the fishing effort required to support necessary biological studies. Some fishing under special contracts was permitted in United States waters to provide information on changes in the status of trout populations.

A quota was set in Canadian waters, based on the requirements of biological studies. The total 1963 catch under these continuing limitations was approximately 100,000 pounds in the United States and 125,000 pounds in Canada.

During 1963 the lake trout stocks continued to improve and some populations on offshore grounds appeared to be reaching a stage where they can support a moderate fishery. Inshore stocks, which were more seriously affected by the lamprey, are still in need of protection. Young native fish are extremely scarce in most inshore areas but an improvement is expected in Wisconsin waters where the first substantial concentrations of spawning fish since 1959 were observed.

The scarcity of young fish on inshore grounds has resulted in heavy plantings of marked lake trout. These plantings and assessment of stocks are carried out by federal, state and provincial agencies in a co-operative program co-ordinated by the Commission. Approximately 2.3 million lake trout were planted in Lake Superior in 1963 and 2.9 million are scheduled for planting in 1964.

In Lake Michigan, 63 of the 99 known lamprey-producing streams have been treated once. Treatment of remaining streams, including several large rivers on the southeast shore, will require two years to complete. Surveys on Lake Huron, which were completed in 1963, have located 90 lamprey streams, mainly in the northern part of the lake. Preliminary surveys were also begun on Lake Ontario in 1963 to provide estimates of the cost of treatments if these were extended to the lower lakes.

Investigation of potential lampricides resulted in the discovery in 1963 of a compound which, when added in small quantities to the lampricide now in general use, almost doubled its effectiveness in hard-water streams. This discovery will substantially reduce the cost of treatments on most Lake Michigan and Lake Huron streams.

The program in 1964 calls for initial treatment of eight streams and re-treatment of 17 streams on Lake Superior. On Lake Michigan, 16 streams are scheduled for initial treatment and 13 streams for re-treatment. Surveys will be continued on both lakes to locate any additional streams which require attention. Electrical barriers will be operated during the spring on 30 streams on Lake Superior and four streams on Lake Michigan to follow changes in lamprey abundance.

In 1962, the Commission's attention was directed to the extreme fluctuations in the abundance of walleye in Lake Erie since their sharp decline in 1957. Information collected by various agencies has been brought together by the Commission for review, but no recommendations for special measures have yet been made.

Canadian members of the Commission during 1963 were Dr. A. O. Blackhurst, Port Dover, Ontario, Dr. J. R. Dymond, Toronto, and Dr. A. L. Pritchard, Director, Conservation and Development Service, Department of Fisheries, Ottawa, who served as Chairman.

NORTH PACIFIC FUR SEAL COMMISSION

Canada, Japan, the U.S.A. and the U.S.S.R. are parties to the Interim Convention on the Conservation of North Pacific Fur Seals of 1957, the objectives of which are to develop the stocks and achieve maximum sustainable productivity of the North Pacific fur seal herds. The Sixth Annual Meeting was held in Washington in 1962, and the Seventh Meeting was scheduled to be held in Moscow in 1964.

In the meantime, recommendations of the Commission on the methods of sealing best suited to achieve the objectives of the Convention were considered at a Conference held in Tokyo in February 1963, attended by representatives of the four countries.

The Conference adopted a report to the governments of the Contracting Parties recommending that they amend the present Interim Convention by concluding a Protocol to the Convention. If all the four governments, after reviewing a draft of the protocol, agreed to its content, it would be opened for signature by the four governments.

The Conference decided to record the understanding of the representatives of the respective governments that it was the intent of the Convention that the North Pacific Fur Seal Commission might make recommendations concerning the conservation of fur seals prior to having determined the relationship between fur seals and other living marine resources, it being understood that when the Commission made such recommendations, it would take into account all pertinent scientific information available at the time.

The suggested protocol would provide for the continued marking of adequate numbers of pups on the rookeries, and for continuation of pelagic research to an extent similar to that of recent years, provided that this would not involve the taking of more than 2500 seals in the eastern Pacific and more than 2200 in the western Pacific, unless the Commission decided otherwise.

The number of seals to be marked on the rookery islands from time to time, as well as the numbers to be taken at sea for research purposes, the times at which such seals should be taken and the numbers to be taken by each party to the Convention would also be determined by the Commission.

Also under the protocol, the Commission would study whether or not pelagic sealing in conjunction with land sealing could be permitted in certain circumstances without adversely affecting achievement of the objectives of the Convention, and would make recommendations thereon to the contracting parties at specified dates in the future.

The Canadian Commissioner during the latter part of 1963 was Dr. W. M. Sprules, Special Assistant to the Deputy Minister of Fisheries, who had been Alternate Commissioner and who replaced the late George R. Clark, former Deputy Minister, on the Commission following the latter's sudden death in February. Dr. Sprules at the same time assumed chairmanship of the Commission, a post held by Mr. Clark.

The Convention contains a provision whereby Canada and Japan each receive 15 per cent of the seal skins taken in commercial operations on the breeding grounds of the Pribilof Islands under U.S. control and, subject to certain specifications, Canada and Japan are entitled to a like percentage of the com-

mercial take on the Commander Islands and Robben Island, which are under control of the U.S.S.R. Canad's share of the North Pacific fur seal skins sold during the fiscal year 1963-64 produced a net revenue of $466,490.

INTERNATIONAL WHALING COMMISSION

Canada has been represented on the International Whaling Commission since its inception in 1946, when it was created under the International Whaling Convention. The Commission recommends catch quotas, closed seasons, minimum size limits and methods of catching whales to member governments. Its recommendations are made following study of scientific findings made by special committees.

At its 1963 annual meeting, held in London, England, July 1-5, the Commission approved a catch limit for Antarctic pelagic whaling of 10,000 blue whale units (a blue whale unit is one blue whale or two fin whales or two and one-half humpback whales or six sei whales).

Increased efficiency in the methods used in whaling and the threat this holds for the whale stocks were considered at the meeting, at which drastic conservation action was advocated. In view of what was considered the dangerous position of the Antarctic blue whale in particular, the Commission decided to recommend that it should be forbidden to kill blue whales in waters south of 40° south latitude, except in the waters north of 55° south latitude, from 0° eastward to 80° east longitude.

Complete protection of the humpback whale in the southern hemisphere was recommended by the Commission in adopting a proposal that it should be forbidden to kill humpbacks in waters south of the Equator, and that the position should be reviewed in three years to determine whether any other action should be taken with respect to the humpback.

It was decided to continue special investigations into Antarctic whale stocks by a Special Committee of Three Scientists and the Scientific Committee of the Commission, so that advice could be provided on the future management of these stocks. Studies are also to be continued of stocks in the North Pacific.

An International Observer Scheme has been worked out by the five countries engaged in Antarctic pelagic whaling—Japan, the Netherlands, Norway, the U.S.S.R. and the United Kingdom. These countries will place observers on each other's factory ships.

During the meeting the Commissioners stood for a short space of time in tribute to the memory of the late George R. Clark, former Canadian Commissioner who had been chairman the previous year. His successor at the meeting was Dr. W. M. Sprules, Special Assistant to the Deputy Minister of Fisheries.

Contracting governments represented at the 1963 meeting were Argentina, Australia, Canada, Denmark, France, Iceland, Japan, Mexico, New Zealand, the Netherlands, Norway, Sweden, the Union of Soviet Socialist Republics, the United States of America and the United Kingdom. Brazil and Panama were not represented. Observers were present from Chile, Italy, Portugal, South Africa, the Food and Agriculture Organization of the United Nations, the International Council for the Exploration of the Sea, the Permanent Commission for the South Pacific, and the International Society for the Protection of Animals.

SPECIAL COMMITTEES

FEDERAL-PROVINCIAL COMMITTEE FOR ONTARIO FISHERIES

THE Federal-Provincial Committee for Ontario Fisheries receives and considers proposals regarding fisheries matters of joint and common interest and makes recommendations to the respective governments with regard to such matters. The Committee meets each year to hear progress reports of research work carried out and to decide upon future activities.

Federal officials on the Committee at the 1963 meeting, held in Ottawa in October, were Dr. A. W. H. Needler, Deputy Minister of Fisheries, and Dr. W. M. Sprules, Special Assistant to the Deputy Minister, who acted as chairman and secretary, respectively; Dr. A. L. Pritchard, Director of the Conservation and Development Service of the Department, and Dr. W. E. Ricker, Acting Chairman of the Fisheries Research Board. Ontario members were F. A. MacDougall, Deputy Minister, Department of Lands and Forests, Dr. C. H. D. Clarke, R. N. Johnston and Dr. F. E. J. Fry.

There are clearly defined responsibilities for each of the governments under the terms of reference of the Committee. For the federal Government these are: lamprey research and control in Lake Superior, and lamprey investigations in the other Great Lakes as required; general fisheries research on Lake Superior; economic studies on all the Great Lakes after consultation with the Ontario Department of Lands and Forests; and technical studies, including gear research and demonstration, also after consultation with the Department of Lands and Forests. The provincial Government has responsibility for: general fisheries research on Lakes Huron, Erie and Ontario; collection of routine statistics of the commercial and sport fish catches on each of the Great Lakes; and hydrographic surveys of a broad general nature on each of the Great Lakes concerned.

Research programs on Lakes Ontario, Erie, St. Clair, Huron and Superior are designed and directed by a "lake co-ordinator" appointed for each lake. The co-ordinators report on the investigations conducted by the two governments as well as, in a general way, on researches carried out by other agencies. Their reports to the annual meeting of the Committee, held in October, showed that a wide range of studies on various species had been conducted during the year.

In the progress reports of investigations, prepared by the Lake Co-ordinators and those responsible for special studies, the following subjects were of special interest: detail of the lake trout planting program for Lake Ontario; results of smelt distribution studies in Lake Erie; a review of experience in managing the Lake Superior lake trout fishery under a quota, and a plan to provide additional facilities required for continuation of the splake selection experiments.

Dr. Clarke and Dr. Pritchard reviewed the events leading to the decision of the Department of Transport to replace the existing marine railways in the Severn River with a system of canals to provide more rapid movement of the increasing number of small boats using this water system. The problem of

particular concern to the Committee was related to the possibility of sea lamprey gaining access from Georgian Bay into inland waters such as Lake Simcoe once the natural barriers to lamprey migration were made ineffective through construction of bypass canals. Although there are no obvious physical barriers to lamprey migration from Lake Ontario in the Trent system lamprey apparently have not gained access to Lake Simcoe through that system. The Committee agreed that as much information as possible should be gathered by the fisheries agencies on lamprey behaviour or experience in other rivers and made available to the Department of Transport before it begins any Severn River construction which could provide new hazards.

Provincial representatives reviewed the gear development projects which had been carried out on certain of the Great Lakes, and the Committee decided to defer detailed consideration of a long-term program of gear development and exploratory fishing until after the Federal-Provincial Fisheries Development Conference, scheduled for the following January.

FEDERAL-PROVINCIAL ATLANTIC FISHERIES COMMITTEE

The function of the Federal-Provincial Atlantic Fisheries Committee is to co-ordinate programs in fisheries matters of mutual concern to the federal Government and the governments of the provinces of Quebec, Nova Scotia, New Brunswick, Prince Edward Island and Newfoundland. The Committee was formed in 1958 and since then has been made up of the deputy ministers of fisheries, or of departments which administer fisheries, of Canada and the aforementioned provinces.

At the fifth annual meeting, held in Ottawa April 25 and 26, 1963, the Committee heard a variety of reports on the industrial development program, the modernization of the fishing fleet, and the work carried out by two special sections of the Committee, one dealing with salmon and trout, the other with oysters. Other matters discussed were inspection, the enforcement of mesh size regulations of the International Commission for the Northwest Atlantic Fisheries, and questions on territorial waters.

The program of the Atlantic Development Board also was reviewed for the Committee, as was the work carried out under the Agricultural Rehabilitation and Development Act, the Atlantic program of the Fisheries Research Board of Canada, and the marine work, in relation to fisheries, of the Department of Public Works. The Committee studied the market outlook for Atlantic fisheries and also considered the various educational projects carried out by federal and provincial agencies, including vocational training, specialized courses involving technological developments, and on-the-job training for deep sea fishermen. There were also reports and reviews on the over-all activities in the fishing industry by federal and provincial departments.

The Fishing Industry, 1963

THE RESULTS of the 1963 operations can be briefly summarized as having been very good on the Atlantic Coast, disappointing on the Pacific Coast and without substantial change in the Inland area.

The 1963 landings totalled 2,278 million pounds, an increase of nearly 5 per cent as compared with 1962. The Atlantic area contributed 61 per cent. the Pacific area 34 per cent and the Inland area 5 per cent. The total value of production of the primary fishing industry is estimated at just under $129 million—about $3 million less than in the previous year. The contribution made by each of the three areas is as follows: Atlantic 59 per cent, Pacific 32 per cent, Inland 9 per cent.

The value of production at the secondary level, i.e. marketed value, should be in the neighbourhood of $255 million of which about 68 per cent was exported. The value of exports of fishery products, at $172 million, was 10 per cent higher than in 1962; this increase is attributed mainly to higher prices received for some products and larger quantities exported. About two-thirds of Canadian exports consist of fresh and frozen fish and shellfish, 15 per cent each of cured fish and canned fish and the remaining 6 or 7 per cent of miscellaneous items, mostly fishmeal and oil. Following the usual pattern, the United States market took 67 per cent of our exports (mostly fresh and frozen fish), Europe 19 per cent (mostly canned and frozen salmon), the Caribbean area 10 per cent (mostly salted and pickled fish) and other countries of the world the remaining 4 per cent.

Canadian imports of fishery products, consisting mostly of specialty products like frozen and canned shrimps, canned anchovies, etc., amounted to $22.8 million — $2 million more than in 1962.

Pacific Area

The value of production in the fisheries of British Columbia in 1963 was 18 per cent below 1962. Two main factors were responsible for this drop: the strike of salmon fishermen at the height of the sockeye runs and the lower prices paid to fishermen for halibut.

The sockeye and pink runs began early in July but the industry was paralyzed by a strike of fishermen and shore workers from mid-July to August 3, and the July catch of all species of salmon dropped by $10 million as compared with July 1962. It was not possible to make up for the losses incurred during that month during the rest of the season.

About 119 million pounds of salmon were landed in 1963 of which 59 million pounds were pinks and 12 million were sockeye. The catch of pinks was far below the all-time high of the 1962 season but well above the average of the

last five years. The canned salmon pack totalled 1.2 million cases, the species composition being as follows:

Species	*Pack (cases)*	*Per cent of Total*
Pink	757,000	63.1
Sockeye	158,000	13.1
Coho	157,000	12.1
Chum	118,000	9.9
Other	11,000	1.8
	1,201,000	100.0

As was the case last year, the proportion of pinks in the total pack was relatively high. It does not seem at the moment, however, that this relatively large pack, coupled with the heavy carryover of the 1962 pack, has created serious marketing difficulties.

Halibut landings by Canadian fishermen at both Canadian and United States ports rose to a record of 37.3 million pounds or 52 per cent of the total United States—Canadian halibut catches. During 1962, prices to fishermen were high as a result of strong demand conditions, especially in the United States. Towards the end

Atlantic coast vessel equipped for Danish seining.

of the year, however, stocks on hand began to increase and in view of the large carryover in both Canada and the United States prices dropped sharply in 1963. In 1962 the average price had been 31.7 cents and was 22.1 cents in 1963.

A record catch was produced again in the herring fishery. Landings of this species totalled 573 million pounds, 127 million more than in 1962 and 82 million lb. more than the previous record of 1956. Prices to fishermen were a little higher than the year before. Prices for herring oil were reported to be good during the year but meal prices were somewhat lower than in the previous year. The market value of all herring products increased from $8.5 million in 1962 to $11.7 million. More than 53,000 tons of herring meal were produced.

There were 15,374 persons licensed by the Department in 1963 compared to 15,060 in 1962. A total of 9,745 commercial fishing craft were used in the British Columbia industry in 1963 with a year end value of $70.9 million. The value placed on fishing gear was $10 million compared with $9.9 million in 1962.

The Atlantic Area

The value of primary fishery production in the Atlantic provinces in 1963 surpassed all previous records reaching $75 million—$7 million more than in 1962.

In the groundfisheries, landings of the main species, e.g., cod, small flatfishes, redfish, were higher than in 1962. Cod landings totalled 605 million pounds—slightly above the average of the last ten years—but due to a good demand for frozen and salted products the value to fishermen exceeded $20 million—an unprecedented figure. The volume of lobster landings decreased by more than 2 million pounds but this was more than offset by higher unit prices.

In the scallop fishery, both the quantity landed and the price obtained by fishermen rose. For the last two years, this fishery has displaced the herring fishery as the third most important fishery on the Atlantic Coast (after the ground fishery and the lobster fishery). Swordfish landings nearly quadrupled in 1963 as compared with 1962 and reached 12.5 million pounds. As a result of this expansion in supply, however, prices to fishermen dropped drastically.

The output of processed groundfish in the major fresh and frozen forms (fillets and blocks) exceeded 200 million pounds—a figure never attained before. About 120 million pounds were produced in the Maritime Provinces and Quebec and 80 million in Newfoundland. Increase in exports was not as large as the increase in production, with the result that year-end stocks were above those of the same date a year earlier.

There was little change in the quantity of cured groundfish produced on the Atlantic Coast in 1963. In Newfoundland, which normally produces between 80 and 85 per cent of the total, the production was 532,000 quintals (light-dry-weight equivalent), only 17,400 quintals above the 1962 figure. The production of light-salted fish increased by more than 25 per cent but that of heavy-salted fish declined by approximately the same percentage. This is a reversal of the trend over the last decade during which the proportion of heavy-salted increased at the expense of light-salted. A brisk market demand encouraged fishermen to concentrate more on the light-salted cure in 1963. Prices continue to be among the highest on record and the demand for salted fish was good on the export

markets, due mainly to short supplies in some European countries, notably Norway. Inventories at the end of December were lower than a year before.

There was a marked expansion in the Atlantic fishing fleets in 1963. This expansion which took place mainly in the groundfishery and scallop fishery was brought about by many factors, the main ones being the bullish nature of the North American market for groundfish products, the threat of powerful fishing fleets from abroad, the discovery of the scallop resources of George's Bank and also the government financial assistance in the construction of larger fishing vessels.

An indication of the expansion which took place can be obtained from the table below which gives the number of trawlers (100 feet or more, O.A.L.) and draggers (over 45 feet but less than 100 ft, O.A.L.) licensed by the Department during the last two fiscal years.

	1962-63	*1963-64*
Trawlers		
Newfoundland	29	32
Nova Scotia	38	53
New Brunswick	—	3
Quebec	—	1
Sub total	67	89
Draggers		
Newfoundland	11	10
Nova Scotia	113	131
New Brunswick	116	122
Prince Edward Island	23	20
Quebec	55	80
Sub total	318	363
Grand total	385	452

The Inland Area

The paucity of current statistical information does not permit presentation of an over-all picture of the situation in this region. The available information indicates that in Ontario over-all landings declined by some 20 per cent but that value to fishermen was slightly above last year. The smelt fishery had been very good in 1961 and 1962 but in 1963 that species was scarce in Lake Erie and the catch dropped substantially. Landings of yellow perch also declined but this was more than offset by higher prices.

In Great Slave Lake, landings of all species were 5.6 million pounds during the calendar year 1963, close to 0.7 million pounds less than in 1962. This was due mainly to the poor ice condition in December which did not allow the fishermen to get out on the lake until late during the month. Prices paid to fishermen were fairly steady and averaged 14 cents for whitefish and 16 cents for trout.

Market difficulties for Canadian freshwater fish, principally whitefish and chub, developed during the late fall in the United States as a result of deaths

attributed to botulism. Apart from the fact that the start of the winter season was delayed because of a long warm fall, winter fishing in general was carried on as usual. In one area, however, a few lakes remained closed. A special committee with federal, provincial and industry representation was set up to keep a close watch on production and marketing conditions. It is too early to make an exact assessment of the situation but at the end of the year it appears to be less serious than it was at the beginning of the winter season.

Statistics of the Fisheries

FISH AND SHELLFISH — LANDINGS AND LANDED VALUES, BY AREAS AND SPECIES 1962 AND 1963

(Principal species)

	Landings		Landed Values	
	1962	1963[1]	1962	1963[1]
	'000 lb.		$ '000	
Pacific Coast	*686,748*	*773,218*	*49,854*	*41,048*
Salmon	163,908	119,320	30,559	22,758
Halibut[2]	34,575	37,274	10,912	8,249
Herring	445,275	572,580	4,752	6,481
Ling Cod	4,308	3,238	469	379
Oysters	7,587	12,778	466	635
Soles and Flounders	6,286	5,686	395	359
Crabs	2,771	3,405	302	405
Shrimps and Prawns	1,663	1,788	268	284
Grey Cod	4,488	6,755	254	414
Other Species	15,887	10,394	1,477	1,084
Atlantic Coast	*1,354,250*	*1,385,396*	*68,373*	*75,248*
Lobsters	46,452	44,304	19,781	21,232
Cod	585,386	605,421	18,904	20,132
Haddock	115,021	91,356	4,869	4,916
Scallops	13,491	16,226	4,524	6,259
Herring	246,502	251,289	3,430	3,045
Small Flatfishes	103,507	126,014	3,323	4,007
Halibut	6,104	4,950	1,776	1,608
Pollock	60,810	56,585	1,656	1,714
Salmon	3,776	3,892	1,752	1,833
Redfish	61,114	82,313	1,585	2,214
Swordfish	3,495	12,482	1,580	2,573
Other Species	108,592	90,564	5,193	5,715

[1]Preliminary figures.

[2]Including halibut landed in United States ports by Canadian fishermen.

FISH AND SHELLFISH — LANDINGS AND VALUES BY AREAS AND PROVINCES 1962 AND 1963

	Landings		Landed Values	
	1962	1963[1]	1962	1963[1]
	'000 lb.		$ '000	
Sea Fisheries — TOTAL	2,040,998	2,158,614	118,227	116,296
Atlantic Coast — TOTAL	1,354,250	1,385,396	68,373	75,248
Nova Scotia	435,903	425,875	32,062	36,176
Newfoundland	549,341	560,791	17,454	19,558
New Brunswick	200,442	230,658	9,038	9,274
Prince Edward Island	37,630	38,314	4,649	4,609
Quebec	130,934	129,758	5,170	5,631
Pacific Coast — TOTAL	686,748	773,218	49,854	41,048
Freshwater Fisheries — TOTAL	137,031	120,000[2]	13,345	12,500[2]
Ontario	63,780	51,000[2]	5,341	5,100[2]
Manitoba	36,105	34,000[2]	4,229	3,900[2]
Saskatchewan	14,999	14,000[2]	1,478	1,300[2]
Alberta	9,025	9,000[2]	714	700[2]
Northwest Territories	6,544	6,000[2]	859	800[2]
Quebec	2,509	2,000[2]	540	500[2]
New Brunswick	4,069	4,000[2]	184	200[2]
GRAND TOTAL	2,178,029	2,278,614	131,572	128,796

[1]Preliminary figures.

[2]Estimated.

FISH AND SHELLFISH — EXPORTS BY TYPES OF PRODUCTS 1962 AND 1963

	Quantity		Value	
	1962	1963	1962	1963
	'000 lb.		$ '000	
Fresh and Frozen Fish, whole or dressed	154,638	143,217	37,697	37,505
Fresh and Frozen Fillets	162,268	172,249	40,591	43,948
Smoked Fish	6,760	9,279	1,376	1,654
Pickled Fish	19,245	20,891	2,396	2,665
Salted And Dried Fish	88,394	106,359	17,574	21,267
Canned Fish	35,484	48,285	19,275	23,776
Molluscs and Crustaceans (fresh and canned)	38,413	40,309	27,459	29,070
Fish Oils ('000 gallons)	7,715	17,645	543	1,073
Miscellaneous	—	—	9,710	11,168
TOTAL	—	—	156,621	172,126

FISH AND SHELLFISH — VALUE OF EXPORTS BY MAIN COUNTRIES OF DESTINATION 1962 AND 1963

	Value	
	1962	1963
	$ '000	
United States	114,303	115,879
United Kingdom	14,126	17,104
Other European Countries	8,584	15,657
Jamaica	5,263	5,693
Puerto Rico	2,984	3,341
Dominican Republic	2,472	2,792
Other Caribbean Areas	5,757	5,725
Australia	1,293	2,039
All Other Countries	1,839	3,896
TOTAL	156,621	172,126

NUMBER OF FISHERMEN IN CANADA, BY AREAS 1961 AND 1962

	1961	1962
SEA FISHERIES	61,457	62,134
British Columbia	16,805	16,437
Maritimes and Quebec	25,896	25,880
Newfoundland	18,756	19,817
FRESHWATER FISHERIES	16,903	16,684
TOTAL	78,360	78,818

VALUE OF FISHING CRAFT IN CANADA, BY AREAS, 1961 AND 1962

	1961	1962
	$ '000	
SEA FISHERIES	95,801	100,687
British Columbia	53,803	57,911
Maritimes and Quebec	30,994	30,372[1]
Newfoundland	11,004	12,404
FRESHWATER FISHERIES[2]	5,938	6,204
TOTAL	101,739	106,891

[1]Excludes Quebec

[2]Excludes Alberta

Appendix 1

FINANCIAL STATEMENTS 1963-64

COMPARATIVE SUMMARY OF EXPENDITURES

Appropriation	1963–64	1962–63	1961–62
	$	$	$
Gratuities to Families of Deceased Employees.	1,035	570	.....
Minister's Salary and Motor Car Allowance...	17,047	17,000	17,000
Departmental Administration.....	466,639	463,298	453,509
Information and Consumer Service.....	261,271	297,418	216,413
Economics Service.....	329,759	308,163	309,390
Industrial Development Service.....	638,996	665,098	690,126
Fishing Bounty.....	159,991	159,480	159,998
Field Services Administration.....	891,020	874,683	860,258
Conservation and Development Service			
Operation and Maintenance.....	6,719,536	6,325,030	6,158,057
Buildings, Works, Land and Equipment....	1,300,334	1,697,963	2,235,426
Inspection Service.....	2,147,902	2,065,793	2,277,244
Fishermen's Indemnity Plan Administration...	263,812	257,223	240,112
SPECIAL			
Canadian share of Expenses of the International Fisheries Commissions.....	1,121,318	1,092,867	1,070,957
Acquisition of Land for the International Pacific Salmon Fisheries Commissions.....	.....	.....	106,261
Newfoundland Bait Service.....	1,650,143	607,693	449,569
Educational Work in Fisheries Techniques, and Co-operative Producing and Selling among Fishermen.....	117,633	114,722	106,482
Fisheries Prices Support Act Administration...	62,867	57,777	60,705
Payment of Assistance to Producers of Salted Fish.....	599,999	600,000	562,461
Assistance in Construction of Fishing Vessels..	500,000	500,000	302,131
Assistance in Construction of Bait Freezing and Storage Facilities.....	22,671	28,313	3,675
Destruction of Dogfish and Other Predators...	.....	.....	147,715
Contribution towards a special Newfoundland Works Program for Fishing Settlement that Experienced Income Reduction Resulting from Decreased Catches.....	.....	.....	266,632
Amount required in the Fishing Vessel Indemnity Account and the Lobster Trap Indemnity Account to Meet Losses incurred in the Operation of the said Accounts during the fiscal year 1963-64.....	196,999	257,333	99,000
Refunds of Amounts Credited to Revenue in Previous Year.....	221	471	.....
FISHERIES RESEARCH BOARD OF CANADA			
Headquarters Administration.....	227,837	218,978	198,904
Operation and Maintenance.....	5,283,540	5,195,332	4,577,822
Land, Buildings and Equipment.....	735,744	1,487,495	1,528,035
TOTALS.....	23,716,314	23,292,700	23,097,882

NOTE: Inspection Service 1961-62, expenditures included an amount of $90,177 for Consumer Service.

COMPARATIVE SUMMARY OF REVENUES

	1963–64	1962–63	1961–62
	$	$	$
Return on Investments			
Pelagic Sealing (Profit on sales of skins)	466,490	488,855	319,464
Interest on Sale to Bonavista Cold Storage Co. Ltd.	500	750	1,000
Miscellaneous	.....	.....	.....
	466,990	489,605	320,464
Privileges, Licenses and Permits	124,659	115,671	116,700
Proceeds from Sales	176,758	116,824	116,850
Service and Service Fees	24,623	33,197	38,815
Refund of Previous Years' Expenditure	61,465	24,929	22,357
Miscellaneous	47,328	63,945	53,591
TOTALS	901,823	844,171	668,777

BAIT SERVICE — NEWFOUNDLAND

Receipts and Payments 1963-64

RECEIPTS:		
Sales of Bait		$ 85,454
Storage and Other Service Charges		3,545
Refund of Previous Years' Expenditure		4,706
Total Receipts		93,705
PAYMENTS:		
Purchase of Bait	89,502	
Other Operating Expenses	361,923	
		451,425
CAPITAL EXPENDITURES:		
Acquisition and Construction of Buildings	50,685	
Acquisition of Equipment	1,148,033	
		1,198,718
Excess of payments over Receipts		1,556,438

FISHING BOUNTY PAYMENTS 1963-64

Province and County	Boats	Men	Amount	Vessels	Tons	Men	Amount	Total Amount
NOVA SCOTIA								
Annapolis	64	94	$ 999.30	5	80	14	$ 219.30	$ 1,218.60
Antigonish	56	82	871.90	1	18	2	37.90	909.80
Cape Breton	128	244	2,555.80	67	2,259	331	5,552.45	8,108.25
Cumberland	13	24	251.80	1	15	2	34.90	286.70
Digby	123	182	1,933.90	74	1,431	193	3,351.35	5,285.25
Guysboro	297	419	4,466.05	28	989	208	3,058.60	7,524.65
Halifax	392	553	5,894.35	39	1,883	467	6,529.65	12,424.00
Inverness	107	180	1,898.00	27	714	91	1,619.45	3,517.45
Kings	15	26	273.70	3	80	7	149.65	423.35
Lunenburg	318	363	3,929.85	22	1,406	282	4,211.90	8,141.75
Pictou	14	22	232.90	.....	.....	.....	.....	232.90
Queens	93	152	1,605.40	25	591	90	1,486.50	3,091.90
Richmond	113	180	1,904.00	4	296	129	1,579.55	3,483.55
Shelburne	349	523	5,552.85	289	4,663	713	11,757.35	17,310.20
Victoria	169	261	2,765.95	3	54	8	133.60	2,899.55
Yarmouth	29	57	596.15	67	1,085	191	2,985.45	3,581.60
TOTAL	2,280	3,362	$35,731.90	655	15,564	2,728	$42,707.60	$78,439.50
PRINCE EDWARD ISLAND								
Kings	210	286	3,055.70	21	793	89	1,678.55	4,734.25
Prince	350	585	6,170.75	3	36	6	95.70	6,266.45
Queens	115	197	2,075.15	.....	.....	.....	.....	2,075.15
TOTAL	675	1,068	$11,301.60	24	829	95	$ 1,774.25	$13,075.85

FISHING BOUNTY PAYMENTS 1963-64—Conc.

Province and County	Boats	Men	Amount	Vessels	Tons	Men	Amount	Total Amount
NEW BRUNSWICK								
Charlotte	68	101	1,072.95	89	1,956	278	4,722.10	5,795.05
Gloucester	400	726	7,623.70	134	3,675	468	8,331.60	15,955.30
Kent	74	121	1,277.95	94	1,074	187	2,934.65	4,212.60
Northumberland	20	26	278.70	98	1,305	190	3,195.50	3,474.20
Restigouche	4	4	43.80	.....	.....	.....	.....	43.80
Saint John	8	17	177.15	.....	.....	.....	.....	177.15
Westmorland	30	43	457.85	1	13	2	32.90	490.75
TOTAL	604	1,038	$10,932.10	416	8,023	1,125	$19,216.75	$30,148.85
QUEBEC								
Bonaventure	81	105	$ 1,125.75	22	672	88	$ 1,547.60	$ 2,673.35
Gaspe	430	681	7,205.95	90	2,157	346	5,599.70	12,805.65
Mag. Isl.	303	822	8,481.90	40	1,264	170	2,955.50	11,437.40
Matane	91	153	1,613.35	.....	.....	.....	.....	1,613.35
Saguenay	570	913	9,654.35	1	43	10	142.50	9,796.85
TOTAL	1,475	2,674	$28,081.30	153	4,136	614	$10,245.30	$ 38,326.60
GRAND TOTAL	5,034	8,142	$86,046.90	1,248	28,552	4,562	$73,943.90	$159,990.80

DISTRIBUTION OF EXPENDITURES

	General	Newfoundland	Nova Scotia	Prince Edward Island	New Brunswick
	$	$	$	$	$
Gratuities to Families of Deceased Employees	1,035	.....	.....	.....	.....
Refunds of Amounts Credited to Revenue in Previous Years	.....	.....	5	65	.....
Minister of Fisheries	17,047	.....	.....	.....	.....
Departmental Administration	466,639	.....	.....	.....	.....
Information and Consumer Service:					
Information Service	170,442	8,071	24,378	.....	.....
Consumer Service	14,080	.....	136	.....	.....
Economics Service	139,475	51,225	51,003	.....	.....
Industrial Development Service	195,059	335,356	35,506	.....	60,792
Fishing Bounty	.....	.....	78,439	13,076	30,149
Field Services Administration	1	275,466	204,291	10,683	26,219
Conservation and Development Service:					
Protection	123,595	713,581	1,049,251	208,546	662,929
Fish Culture	.....	100,716	583,899	79,941	329,704
Construction or Acquisition:					
Protection	.....	34,865	31,064	318	14,628
Fish Culture	.....	33,382	70,682	46,559	82,985
Inspection Service	57,278	507,151	527,965	91,929	212,550
Fishermen's Indemnity Plan Administration	18,788	68,398	59,958	6,747	13,475
Canadian Share of Expenses of the International Fisheries Commissions	3,681	.....	12,524	.....	.....
Newfoundland Bait Service	.....	1,650,143	.....	.....	.....
Educational Work in Fisheries Techniques and Co-Operative Producing and Selling Among Fishermen	.....	29,905	35,546	4,730	11,423
Fisheries Prices Support Act — Administration	37,353	25,044	262	19	106
Payment of Assistance to Producers of Salted Fish	.....	369,316	122,808	12,033	44,224
Assistance in Construction of Fishing Vessels	.....	42,850	150,303	80,285	.....
Assistance in Construction of Bait Freezing and Storage Facilities	.....	22,671	.....	.....	.....
Fishing Vessel and Lobster Trap Indemnity Accounts	.....	27,975	39,941	8,796	2,731
Fisheries Research Board of Canada—					
Headquarters Administration	227,837	.....	.....	.....	.....
Operation and Maintenance	48,567	802,574	560,420	.....	914,292
Construction or Acquisition	.....	32,552	182,656	.....	137,855
	1,520,877	5,131,241	3,821,037	563,727	2,544,062

DISTRIBUTION OF REVENUE

	General	Newfoundland	Nova Scotia	Prince Edward Island	New Brunswick
	$	$	$	$	$
Return on Investments	466,990	.....	.....	.....	.....
Privileges, Licenses and Permits	.....	21,305	17,761	6,246	13,373
Proceeds from Sales	446	167,912	3,631	1,766	.....
Service and Service Fees	.....	7,030	211	.....	.....
Refund of Previous Year's Expenditure	57,566	.....	53	73	.....
Miscellaneous	120	5,817	5,172	2,580	5,027
	525,122	202,064	26,828	10,665	18,400

BY PROVINCES 1963-64

Quebec	Ontario	Manitoba	Saskat-chewan	Alberta	British Columbia	Yukon Territory	Northwest Territories	Total
$	$	$	$	$	$	$	$	$
.....	.....	.....	.....	.....	.....	.....	.....	1,035
.....	.....	.....	.....	.....	151	.....	.....	221
.....	.....	.....	.....	.....	.....	.....	.....	17,047
.....	.....	.....	.....	.....	.....	.....	.....	466,639
.....	.....	.....	.....	.....	19,776	.....	.....	222,667
7,496	7,623	9,234	.....	35	.....	.....	.....	38,604
.....	.....	.....	.....	.....	88,056	.....	.....	329,759
603	.....	.....	.....	.....	11,680	.....	.....	638,996
38,327	.....	.....	.....	.....	.....	.....	.....	159,991
40,804	7,088	40,648	1,244	.....	265,558	1,677	17,341	891,020
.....	.....	1,913	.....	.....	1,998,599	19,873	90,583	4,868,870
.....	.....	.....	.....	.....	756,239	167	.....	1,850,666
.....	.....	36	.....	.....	521,214	2,510	55,757	660,392
.....	.....	.....	.....	.....	406,294	40	.....	639,942
255,857	102,719	99,895	35,694	15,253	191,252	.....	50,359	2,147,902
32,474	.....	.....	.....	.....	63,972	.....	.....	263,812
.....	506,653	.....	.....	.....	598,460	.....	.....	1,121,318
.....	.....	.....	.....	.....	.....	.....	.....	1,650,143
27,097	.....	.....	.....	.....	8,932	.....	.....	117,633
83	.....	.....	.....	.....	.....	.....	.....	62,867
51,618	.....	.....	.....	.....	.....	.....	.....	599,999
226,562	.....	.....	.....	.....	.....	.....	.....	500,000
.....	.....	.....	.....	.....	.....	.....	.....	22,671
14,998	.....	.....	.....	.....	102,558	.....	.....	196,999
.....	.....	.....	.....	.....	.....	.....	.....	227,837
375,715	316,190	.....	.....	.....	2,265,782	.....	.....	5,283,540
36,137	10,500	.....	.....	.....	336,044	.....	.....	735,744
1,107,771	950,773	151,726	36,938	15,288	7,634,567	24,267	214,040	23,716,314

BY PROVINCES 1963-64

Quebec	Ontario	Manitoba	Saskat-chewan	Alberta	British Columbia	Yukon Territory	Northwest Territories	Total
$	$	$	$	$	$	$	$	$
.....	.....	.....	.....	.....	.....	.....	.....	466,990
3,095	200	26	.....	.....	45,114	11,690	5,849	124,659
.....	.....	.....	.....	.....	3,003	.....	.....	176,758
.....	17,382	.....	.....	.....	.....	.....	.....	24,623
3,754	.....	.....	.....	.....	19	.....	.....	61,465
.....	.....	.....	20	.....	28,146	.....	446	47,328
6,849	17,582	26	20	.....	76,282	11,690	6,295	901,823

Appendix 2

FISH CULTURE DEVELOPMENT STATEMENTS, 1963

FISH DISTRIBUTED BY SPECIES 1963

Species	Fry and Advanced fry	Fingerlings	Yearlings and Older	Total Distributions
Salmo salar — Atlantic salmon	660,870	9,773,317	630,726	11,064,913
Salmo trutta — Brown trout	.....	3,261,894	14,979	3,276,873
Salmo gairdneri — Rainbow trout	.....	185,740	9,897	195,637
Salmo salar sebago — Sebago salmon	.....	40,000	.....	40,000
Salvelinus fontinalis — Speckled trout	4,204,437	17,243,521	272,565	21,720,523
Salvelinus namaycush — Lake trout	.....	196,310	.....	196,310
	4,865,307	30,700,782	928,167	36,494,256

DISTRIBUTIONS BY PROVINCES 1963

Fry, Fingerlings, Yearlings and Older Fish

Province	Fry and Advanced fry	Fingerlings	Yearlings and Older	Total Distribution	
				By Species	By Province
NOVA SCOTIA					
Atlantic salmon	442,870	2,591,907	333,783	3,368,560	.....
Brown trout	.....	3,261,894	14,617	3,276,511	.....
Lake trout	.....	127,000	.....	127,000	.....
Rainbow trout	.....	137,300	7,679	144,979	.....
Speckled trout	1,075,437	9,672,237	131,636	10,879,310	.....
	1,518,307	15,790,338	487,715	17,796,360	17,796,360
NEW BRUNSWICK					
Atlantic salmon	218,000	7,009,410	282,943	7,510,353	.....
Brown trout	.....	.....	362	362	.....
Lake trout	.....	69,310	.....	69,310	.....
Rainbow trout	.....	6,700	2,218	8,918	.....
Sebago salmon	.....	40,000	.....	40,000	.....
Speckled trout	3,124,000	7,211,034	116,897	10,451,931	.....
	3,342,000	14,336,454	402,420	18,080,874	18,080,874
PRINCE EDWARD ISLAND					
Atlantic salmon	.....	172,000	14,000	186,000	.....
Rainbow trout	.....	41,740	.....	41,740	.....
Speckled trout	5,000	360,250	24,032	389,282	.....
	5,000	573,990	38,032	617,022	617,022
TOTALS	4,865,307	30,700,782	928,167	36,494,256	36,494,256

CO-OPERATIVE OR SPECIAL TRANSFERS AND STOCK SUPPLIED FOR SCIENTIFIC INVESTIGATIONS, 1963

Species	From	To	Number	Details	Date
Atlantic Salmon	Cobequid	Fisheries Research, Halifax	22,000	Green Eggs	Nov. 7–20/63
	Cobequid	Jasper National Park	100,000	Eyed Eggs	Feb. 21/63
	Cobequid	Sydney, Australia	200,000	Eyed Eggs	Feb. 21/63
	Coldbrook	Fisheries Research, Halifax	105	1 Year	June 12/63
	Florenceville	R. MacDonald (Biologist)	1,500	1 Year	Aug. 5/63
	Florenceville	Dr. Anderson, U.N.B., Fredericton	550	1 Year	Mar. 6, Apr. 18, Oct. 11, Nov. 8/63
	Florenceville	Dr. Anderson U.N.B., Fredericton	500	#3, 4 & 5 Fingerlings	Mar. 6, Apr. 18, Oct. 11, Nov. 8/63
	Florenceville	Dr. Anderson, U.N.B., Fredericton	100	2 Years	Apr. 18/63
	Kejimkujik	Charleston Ponds (N.S. Government)	100,000	#3	Sept. 4 & 5/63
	Margaree	Fish Disease Lab., Leetown, U.S.A.	50	#1 Fingerlings	June 25/63
	Miramichi	Fisheries Research, Pollett River	2,040	2 Years	May 28/63
	Miramichi	Fisheries Research, N.W. Miramichi	4,600	1 Year	Sept. 18/63
	Miramichi	Fisheries Research, N.W. Miramichi	4,400	1 Year	Sept. 19/63
	Miramichi	Montpelier, Vermont	103,400	Eyed Eggs	Mar. 12/63
	Miramichi	Gansevoot, New York	155,100	Eyed Eggs	Mar. 12/63
	Saint John	Fisheries Research, St. Andrews	830	1 Year	Apr. 25, May 22, 23/63
	Saint John	Regional Biologist, Halifax	700	Fry	May 28/63
	Saint John	Fisheries Research, St. Andrews	650	#3 Fingerlings	Sept. 25, Dec. 13
	Saint John	Fisheries Research, St. Andrews	3,765	2 Years	Apr. 25, May 15
	Saint John	Western University of Ontario	100	#4 Fingerlings	Nov. 14/63
	Saint John	Montreal University	300	1 Year	June 10/63
	Saint John	Carlton University	800	#4 Fingerlings	Nov. 14/63
	Saint John	Carlton University	400	1 Year	Nov. 14/63
Brown Trout	Lindloff	Fisheries Research, Halifax	4	4 Years	June 6/63
Rainbow Trout	Cardigan	Fisheries Research, Simpson's Pond	4,000	#3 Fingerlings	Oct. 24/63
	Lindloff	Fisheries Research, Halifax	4	4 Years	June 6/63
	Saint John	Fisheries Research, St. Andrews	306	#5 Fingerlings	May 22/63
	Saint John	Fisheries Research, St. Andrews	300	1 Year	June 7/63
Sebago Salmon	Enfield Hy, Maine	Florenceville	90,000	Eyed Eggs	Feb. 26/63
Speckled Trout	Antigonish	Jasper National Park	535,000	Eyed Eggs	Jan. 17/63
	Antigonish	Moser River Ponds (N.S. Government)	125,000	#1, 2 & 3 Fingerlings	July–Sept.
	Antigonish	N.S. Museum of Science, Halifax	8	2 Years	Aug. 1/63
	Cardigan	Fisheries Research at Ellerslie	4,000	#5 Fingerlings	Dec. 2/63
	Cardigan	Fisheries Research at Cains Brook	1,953	1 Year	Dec. 5 & 6/63
	Cobequid	Jasper National Park	500,000	Eyed Eggs	Jan. 31/63
	Florenceville	University of New Brunswick	25	#4 Fingerlings	Oct. 11/63
	Lindloff	Fisheries Research, Halifax	4	2 Years	June 6/63
	Saint John	Fisheries Research, St. Andrews	50	#5 Fingerlings	Dec. 13/63

COLLECTION AND DISPOSAL OF EGGS BY SPECIES — 1963

Species	Collection Area	Collection Period	Total Number	Disposal	Date of Transfer	Number	Total by Species
Atlantic Salmon	Margaree	Oct. 30–Nov. 30	1,034,913	Margaree	Oct. 30–Nov. 30	1,034,913	
	River Phillip	Nov. 6–Dec. 4	2,083,600	Cobequid	Nov. 6 & 12	1,340,675	
				Kejimkujik	Nov. 14	525,675	
				Cobequid	Nov. 19	61,125	
				Research Bd	Nov. 7–20	22,000	
				Cobequid	Dec. 4	134,125	
	New Mills	Oct. 22–Nov. 13	1,628,400	Charlo	Oct. 22–Nov. 13	1,628,400	
	Restigouche	Oct. 22–Oct. 30	52,000	Charlo	Oct. 22–30	52,000	
	Miramichi (Charlo)	Oct. 22–29	42,500	Charlo	Oct. 22 & 29	42,500	
	Miramichi	Oct. 22–Nov. 13	4,802,250	Miramichi	Oct. 22, 24, 29, Nov. 1	3,776,250	
				Craig Bk (U.S.A.)	Nov. 1	504,000	
				Grand Falls	Nov. 4	355,500	
				Miramichi	Nov. 8 & 13	166,500	
	Miramichi (Curventon Up)	Oct. 21–Nov. 1	133,300	Miramichi	Oct. 22, 24, 28, Nov. 1	133,300	
	Miramichi (Curventon Dn)	Oct. 22	25,800	Miramichi	Oct. 22	25,800	
	Florenceville	Oct. 31–Nov. 18	446,700	Florenceville	Oct. 31–Nov. 18	466,700	
	Saint John	Oct. 28–Nov. 12	253,260	Saint John	Oct. 28–Nov. 12	253,260	10,502,723
Brown Trout	Antigonish	Oct. 21–Nov. 13	351,852	Antigonish	Oct. 21, 30, Nov. 13	351,852	
	Kejimkujik	Nov. 4	7,000	Kejimkujik	Nov. 4	7,000	
	Cobequid	Oct. 28–Nov. 14	705,600	Cobequid	Oct. 28–Nov. 4–14	705,600	
	Lindloff	Oct. 21–Nov. 12	1,001,285	Lindloff	Oct. 21–Nov. 12	1,001,285	
	Saint John	Oct. 23–Nov. 13	424,496	Saint John	Oct. 23–28–Nov. 4–13	424,496	
	Yarmouth	Oct. 21–Nov. 18	1,138,670	Yarmouth	Oct. 21–Nov. 18	1,138,670	3,628,903
Rainbow Trout	Lindloff	Apr. 3–19	583,200	Lindloff	Apr. 3, 10 & 19	583,200	
	Saint John	Apr. 24–May 9	167,978	Saint John	May 3–9	167,978	751,178
Sebago Salmon	Chamcook Lake	Nov. 14–Nov. 19	94,672	Saint John	Nov. 14 & 19	94,672	94,672
Speckled Trout	Antigonish	Nov. 6–Nov. 18	6,185,615	Antigonish	Nov. 6–18	4,685,615	
				Yarmouth	Nov. 13	1,500,000	
	Cardigan	Oct. 31–Nov. 20	1,062,800	Cardigan	Oct. 31–Nov. 20	1,062,800	
	Cobequid	Oct. 29–Nov. 14	3,639,850	Kejimkujik	Nov. 15	358,800	
				Cobequid	Oct. 29–Nov. 14	3,281,050	
	Coldbrook	Nov. 6–22	414,096	Coldbrook	Nov. 6–22	414,096	
	Florenceville	Oct. 21–Nov. 12	2,832,400	Florenceville	Oct. 21–Nov. 12	2,832,400	
	Grand Falls	Oct. 16–Nov. 8	3,117,200	Grand Falls	Oct. 16–Nov. 8	3,117,200	
	Lindloff	Oct. 29–Nov. 4	2,736,800	Lindloff	Oct. 29–Nov. 4	2,736,800	
	Margaree	Oct. 31–Dec. 2	5,385,178	Margaree	Oct. 31–Dec. 2	3,382,149	
				Coldbrook	Nov. 8	2,003,029	
	Saint John	Oct. 21–Nov. 16	8,650,627	Saint John	Oct. 21–Nov. 16	8,650,627	34,024,566
					Total Collection, All Species		49,002,042

DISTRIBUTIONS

Key to Abbreviations

Species

- A Atlantic Salmon
- B Brown Trout
- C Arctic Char
- G Lake Trout
- L Landlocked or Sebago Salmon
- S Speckled Trout
- R Rainbow Trout

Stages of Development

- a Green eggs
- b Eyed eggs
- c Fry
- d Advanced fry
- 1 No. 1 fingerlings
- 2 No. 2 fingerlings
- 3 No. 3 fingerlings
- 4 No. 4 fingerlings
- 5 No. 5 fingerlings
- f Yearlings
- g Two years
- h Three years
- K Older fish

Classifications

Advanced Fry: Fish for a period of two weeks following complete absorption of the yolk sac.

Fingerlings:

- No. 1 From two to eight weeks after complete absorption of the yolk sac.
- No. 2 From eight to fourteen weeks after complete absorption of the yolk sac.
- No. 3 From fourteen to twenty weeks after complete absorption of the yolk sac.
- No. 4 From twenty to twenty-six weeks after complete absorption of the yolk sac.
- No. 5 From twenty-six weeks to one year from date of hatch.

Distribution Statements by Fish Culture Stations

NOVA SCOTIA

Antigonish Fish Culture Station

Antigonish County
Lochaber Lake—80,000 S1, 21,180 S2, 15,210 S3, 900 Sf.
MacMillan Lake—80,000 S1.
Middleton Lake—4,236 S2.
Pomquet River
Black River—10,000 S1.
Glenroy River—60,000 S1.
Meadow Green River—60,000 S1, 3,000 S3, 700 Sf.
Springfield Brook—30,000 S1.
South River—1,000 S3, 1,800 B3, 484 S4.
Copper Lake—80,000 S1.
Grants Lake—8,472 S2.
MacDonald Lake—80,000 S1, 900 S3.
MacKinnon Lake—4,236 S2.
Pinevale Lake—80,000 S1, 900 S3.
Polson Brook—40,000 S1.
South River Lake—6,480 B3, 450 Sf.
Big Brook—80,000 S1.
West River—30,000 S1, 1,059 Sf.
Beaver Meadow River—30,000 S1. 2,000 S3.
Brierly Brook Lake—8,472 S2.
Cameron Lake—80,000 S1.
MacInnis Lake—8,472 S2.
Mooney Lake—4,236 S2.
St. Joseph Lake—30,000 S1, 2,000 S3.
Thompson Lake—80,000 S1.
Gaspereaux Lake—30,000 S1, 2,000 S3.
Afton River—18,000 S1.
Clydesdale Brook—18,000 S1.
Delhantys Lake—10,000 S1.
Heffernan Brook—18,000 S1.
Linwood Lake—18,000 S1.
Maryvale Brook—18,000 S1.
Merland Lake—5,000 S1.
Monastery Pond—5,000 S1.
North Lake—18,000 S1, 450 Sg.
North River—18,000 S1.
Rights River—18,000 S1.
Simms Lake—4,236 S2.
Ash Lake—18,000 S1.
South River Estuary—165 Bk.

Pictou County
Caribou River—3,912 S2.
Cole Pond—2,400 S2.
English Pond—2,400 S2.
Graham Pond—1,200 S2.
MacKay Dam—1,200 S2.
Mill Dam—4,800 S2.
Peterson Pond—2,400 S2.
East River—64,800 B1, 8,472 S2, 14,000 B3.
Burrough Lake—9,000 S2.
Brookville Pond—4,236 S2.
Calder Lake—11,904 S2, 450 Sf.
Castel Brook—4,236 S2.
Grants Lake—11,904 S2, 266 Sf.
Kittle River—8,472 S2.
Jocks Lake—8,000 S1.
MacLean Lake—3,432 S2.
MacLellan Brook—8,472 S2.
MacKinnon Lake—14,400 S2, 450 Sf.
MacPherson Lake—266 Sf, 8,472 S2.
Smith Lake—4,236 S2.
Taylor Lake—12,708 S2.
Taylors Lake—4,236 S2.
Upper East River—4,236 S2.
West Branch Lake—10,590 S2.
Merrigomish Harbour
Barney River—12,900 B1, 7,200 B2, 4,700 S3.
Bailey Brook—1,000 S3.
Brora Lake—5,472 S2.
French River—900 S3.
Haggarts Lake—2,736 S2.
Indian Lake—2,736 S2.
Robertson Lake—5,472 S2.
Sutherland River—12,900 B1, 7,200 B2, 1,800 S3.
Middle River—7,200 S2.
Gairloch Lake—7,200 S2.
Hood Lake—6,354 S2.
River John—6,480 B3.
West Branch River John—7,824 S2, 4,500 B2, 3,750 B3, 225 Sf.
East Branch River John—7,824 S2, 4,500 B2, 3,750 B3, 225 Sf.
Black Brook Lake—8,000 S1.
Chance Hbr. Lake—450 Sg.
Eden Lake—16,000 S1, 9,000 S2.
Little Bear Lake—2,000 S3.
Long Lake—1,000 S3.
Toney River—3,912 S2.

Guysborough County
Country Hbr. River—1,480 Af.
Archibald Lake—2,000 S3.
Borneo Lake—5,000 S1.
Chain Lake—2,400 S2.
Christie Lake—2,400 S2.
Country Hbr. Lake—5,000 S1.
Dummy Lake—8,472 S2.
Eight Island Lake—40,000 S1.

Guysborough County (cont.)—
Goshen Lake—40,000 S1.
Horahan Lake—40,000 S1.
Hurleys Lake—16,000 S1.
Letter "G" Lake—4,236 S2.
Mells Lake—12,000 S1.
Polson Lake—12,000 S1.
Stewart Lake—12,000 S1.
Tate Lake—4,800 S2.
Trout Lake—4,800 S2.
Salmon River—1,480 Af, 12,900 B1, 12,708 B2.
Beaver Dam Lake—8,000 S1.
Bobsled Lake—6,864 S2.
Bordens Lake—5,148 S2.
Cemetery Lake—1,000 S3.
Charlies Lake—3,530 S2.
Cross Lake—7,060 S2, 2,000 S3.
Gearys Lakes—16,000 S1.
Grants Lake—9,600 S2.
Island Lake—7,060 S2, 2000 S3.
Lawlor Lake—1,716 S2, 1,000 S3.
Longs Lake (No. 1)—14,400 S1.
Long Lake—1,250 S3.
MacDonald Lake—8,000 S1, 1,250 S3.
Millers Lake—8,000 S1.
Mud Lake—800 S3.
Narrow Lake—3,530 S2.
O'Neil Lake—900 S3.
Priest Lake—4,290 S2.
Rocky Lake—4,800 S2.
Round Lake—3,432 S2.
Square Lake—9,600 S1.
Three Cornered Lake—1,800 S3.
Whites Lake—800 S3.
Coddles Harbour
Goose Lake—3,912 S2.
Green Barren Lake—3,600 S2.
Long Lake—3,912 S2.
Sister Lakes—9,780 S2.
St. Mary's River
Archibald Lake—2,500 S3, 225 Sg.
Archibald Mill Dam Lake—7,200 S2.
Cameron Lake—4,800 S2.
Chisholm Lake—3,600 S3.
Cumminger Lake—8,000 S1, 4,290 S2.
Demmons Lake—8,000 S1.
Elbow Lake—1,716 S2, 2,000 S3.
Indian Man Lake—3,432 S2.
Long Lake—1,716 S2.
Kirks Lake—8,472 S2.
MacIntosh Lake—1,000 S3.
McKeens Lake—8,472 S2.
McKeens Brook—700 Sf.
McLeods Lake—8,000 S1.
Melrose Lake—8,000 S1, 4,290 S2.
Murray Lake—5,000 S1.
Mud Lake—1,716 S2.
Sherbrooke Lake—8,000 S1, 4,290 S2.
Taylor Lake—5,000 S1.
Trout Lake—8,472 S2.
Twin Oak Lakes—1,716 S2, 1,000 S3.
Two Mile Lake—80,000 S1, 1,800 S3.
East River, St. Mary's—17,992 Af. 90,000 Ad.
West River, St. Mary's—13,320 Af, 90,000 Ad.
Dover Bay
Boudreau Lake—3,432 S2.
Hazel Hill Lake—16,800 S1.
Mackloware Lake—2,145 S2.
Snyder Lake—3,432 S2.
Three Mile Lake—16,800 S1, 2,000 S3.
Two Bridge Lake—2,145 S2.
Watkins Lake—16,800 S1.
Whistle Lake—16,800 S1.
Donahue Lake—60,000 S1, 13,200 S3, 450 Sf.
Fougere Lake—7,824 S2, 2,000 S3.
Horshoe Lake—12,000 S1, 2,400 S2.
Toms Lake—3,912 S2.
Trout Lake—3,600 S2.
Ecum Secum River—7,400 Af, 55,000 Ad.
Ash Lake—15,000 S1.
Spider Lake—15,000 S1.
Gegoggin Harbour
Gegoggin Lake—15,000 S1.
Grassy Lake—8,000 S1.
Guysboro River—12,900 B1, 12,708 B2, 6,480 B3.
Cudahys Lake—8,000 S1, 2,500 S3.
Cutlers Lake—8,000 S1.
Fraisers Lake—4,236 S2.
Meaghers Lake—8,000 S1.
Nickersons Lake—16,000 S1.
Ross Lakes—12,708 S2.
Campbells Lake—8,472 S2.
Liscomb River—40,000 Ad, 4,440 Af, 5,000 S1, 4,660 S3.
Big Pond—5,000 S1.
Gaspereaux Brook—1,480 Af, 15,000 S1.
Hardwood Lake—2,500 S3.
Kirby Lake—5,000 S1.
Long Lake—5,000 S1.
Whidden Lake—2,500 S3.
Eastern Hill Lake—10,000 S1.
New Harbour River—
Basin Lake Run—9,780 S2, 442 Sg.
Big Pond—3,912 S2.
Canters Lake—7,824 S2, 2,000 S3.
Cupboard Lake—3,912 S2, 2,000 S3.
Eastern Brook—5,868 S2.
First Lake—3,912 S2.
Bear Lake—15,000 S1.
Cooee Coffre Lake—16,800 S1.
Coopers Lake—16,000 S1.
Dobson Lake—16,800 S1, 1,000 S3.
Eastern Brook—4,800 S2.
First Lake—8,000 S1.
Fishermans Hbr. Lake—16,000 S1, 3,750 S3
Giants Lake—281 Rf.
Coldbrook Lake—12,000 S1.
Goose Hbr. Lakes—45,000 S1, 10,500 S3.
Grassy Lake—2,000 S3.
Harts Lake—10,000 S1.
Hawbolt Lake—15,000 S1.
Indian Hbr. Lakes—39,816 B2, 12 Sf, 9 Sg.
Indian River—1,250 S3, 675 Sg.
Isaacs Hbr. River—38,900 Ad, 1,480 Af.
Jellows Lake—45,000 S1, 7,500 S3.
Jones Lake—24,000 S1.
Leonard Lake—8,000 S1.

Antigonish Fish Culture Station—Conc.

Guysborough County (Cont.)—
MacPherson Lake—20,000 S1, 225 Sf.
Mannassette Lake—10,000 S1, 225 Sf.
Mattie Lake—36,000 S1.
Morrison Lake—18,000 S1.
Mill Dam Pond—8,000 S1.
Seal Hbr. Lake—10,000 S1.
Shepherds Lake—8,000 S1.
Simpsons Lake—10,000 S1.
Sundown Lake—10,000 S1.
Tor Bay Basin Run—5,868 S2.
Trifords Brooks—8,000 S1.

Speckled trout	2,889,302
Atlantic salmon	362,972
Brown trout	247,937
Rainbow trout	281
Total distribution	3,500,492

Cobequid Fish Culture Station

Colchester County
Bass River—36,000 S1, 8,000 S2.
Silica Lake—9,000 S1, 7,500 S3.
Bass River(Five Islands)—22,500 S1.
Bowers Brook—2,000 S1.
Chiganois River—30,000 S1, 10,000 S3.
Black Lake—3,000 S2.
Clear Lake—3,600 S2.
Farm Lake—9,000 S2.
Frog Lake—9,000 S2.
Galloping Brook—7,500 S2, 3,000 S3, 500 Sf.
Guyons Lake—4,500 S2.
Debert River—
Raynor Gravel Pit—3,000 S3.
East River—12,000 S1.
Beaver Brook—9,000 S1.
Economy River—80,000 A2.
Economy Lake—25,000 S1, 16,000 S2.
Moose Lake—2,000 S1.
Newton Lake—25,000 S1, 12,000 S2.
Simpson Lake—30,000 S1, 15,000 S2, 12,000 S3, 1,300 Sf.
Round Lake—150 Sf, 50 Sh.
Folly River—30,000 S1, 3,000 S3.
Folly Lake—20,000 S1, 7,000 S2, 9,000 S3, 2,500 Sf.
French River—33,750 S1, 5,000 S3.
Whippy Lake—3,000 S2.
Whirley Waugh Lake—9,000 S3.
Great Village River—19,500 S1.
Irwin Lake—500 Sf.
Little Dyke Lake—50 Sh.
Moose River—
Hatfields Pond—1,000 S3.
North River—9,000 S1, 80,000 A2.
Portapique River—37,500 S1, 56,000 A2.
River Philip—
West Lake—7,000 S1.
Salmon River—105,000 A2, 8,000 Af.
Bates Pond—500 S2.
Hingley Lake—9,000 S2.
Proudfoot Lake—2,500 S3.
Truro Gravel Pit—75 Sg, 25 Sh.
Stewiacke River—
Deyarmonds Lake—13,500 S1.
Little River—21,000 S1, 500 Sf.
Moose Lake (Riverdale)—16,000 S2.
Moose Lake—4,000 S3.
Trenholm Pond—2,000 S1.
Trout Lake—4,000 S3.
Wallace River—
Hart Lake—45,000 S1.
Waughs River—165,000 B1, 164,462 B2, 268 Bh.
Earlton Lake—6,000 S1, 5,000 S3.

Cumberland County—
Apple River—70,000 A2.
Fox River—24,000 S1.
Lake Kilarney—400 Sh.
Maccan River—1,500 Sf, 50,000 A1, 68,000 A2, 8,000 Af.
Cleveland Lake—250 Sf.
Fordyce Brook—12,000 S1, 4,000 S3.
Harrison Lake—80,000 B1, 28,000 B2.
Lawrence Brook—16,800 S1, 4,000 S3.
South Brook—8,000 S1, 4,000 S3.
Mattatall Lake—300 Sh.
LaPlanche River—
Long Lake—1,000 Sf.
McLellans Brook—15,000 S1, 7,500 S3.
Sand Lake—1,000 Sf.
Parrsboro River—
Leaks Lake—215 Sg.
McAloney Lake—9,000 S2.
Portapique River—
Fountain Lake—18,000 S1, 9,000 S3, 200 Sf.
Isaac Lake—14,000 S1, 4,000 S2, 7,500 S3, 950 Sf.
Little Lake—3,000 S1.
Newfound Lake—14,000 S1, 4,000 S2, 7,500 S3, 950 Sf.
Otter Lake—3,600 S1.
Sutherland Lake—33,000 S1, 3,000 S2, 16,500 S3, 1,400 Sf.
Pugwash River—18,000 S1.
Doherty Creek—6,750 S1.
Victoria Lake—425 Sh.
Ramshead Lake—10,800 S1.
Ranshead River—15,000 S1, 3,000 S2.
River Hebert—20,000 S1, 3,500 S2.
Forty Puzzle Lake—2,000 S2.
Halfway River Lake—175 Sh.
River Philip—11,500 S3, 2,240 Sf, 260,000 A2, 9,698 Af.
Black River—21,000 S1, 7,500 S3.
Fitzsimmons Brook—8,000 S1.
Mountain Brook—4,000 S2.
Poison Lake—2,700 S1, 2,000 S3.
Polly Brook—12,000 S1, 3,000 S3.

Cobequid Fish Culture Station—Conc.

Cumberland County (cont'd.)—
River Philip—(Cont.)
River Philip (W. Br.)—27,000 S1, 3,500 S3
Sugarloaf Brook—15,000 S1, 7,500 S2.
Tillies Creek—20,000 S1.
Thompson's Pond—500 S1.
Vickery Lake—8,000 S1.
Shinimicas River—33,600 S1, 9,000 S3, 30,000 A1.
Brownell Brook—12,000 S1.
Tidnish River—20,000 S1, 15,000 S2.
Tidnish Pond—3,000 Sd.
Wallace River—110,000 S1, 56,500 S2, 23,500 S3, 1,000 Sf, 50,000 A1, 100,000 A2, 8,000 Af.
Barbour Lake—4,500 S1.
Dewar Lake—400 Sh.
Wallace River (W. Br.)—80,000 S1, 10,000 S2.

Westmorland County, N.B.—
Memramcook River—
Palmer's Creek—7,500 S2.
Missiguash River—
Pont a buot Bog—3,600 S2.
Tantramar River—
Big Lake (Jolicure)—4,500 S3.
Bulmer's Pond—8,000 S2.
Calhouns Brook—10,500 S2.
Carters Brook—5,500 S2.
Clarklyn Brook—10,800 S1.
Jenks Brook—10,800 S1.
North Brook—3,600 S1.
North Lake—1,200 Sf.
Robinson Brook—10,000 S1, 12,500 S2, 4,500 S3.
Silver Lake—15,000 S1, 22,500 S2.

Speckled trout	1,647,155
Brown trout	437,730
Atlantic salmon	982,698
Total distribution	3,067,583

Coldbrook Fish Culture Station

Kings County—
Annapolis River—10,400 Af.
Cornwallis River—60,000 S1, 5,000 S4, 17,400 Ad.
Beech's Brook—5,000 S4.
Clarks Brook—3,000 S5.
Farm Brook—5,000 S4.
Mill Brook—5,000 S4.
MeGee Lake—10,000 S4.
Silver Lake—5,000 S5.
Tupper Lake—768 Sf.
Canard River—5,000 S3.
Chipman Brook—19,728 S1.
McGowan Brook—19,728 S1.
Suttons Pond—5,000 S4.
Canning River—5,000 S3.
Gaspereau River—5,200 Af.
Aylesford Lake—10,000 S4.
Hudson Lake—231 S5, 300 Sf.
Loon Lake—10,000 S4.
Murphy Lake—10,000 S4.
Lanes Mill Brook—5,200 Af.
North River—54,000 S1, 10,000 S4.
Habitant River—5,000 S3.
North Brook—19,728 S1.
Sleepy Hollow Brook—19,728 S1.
Steam Mill Brook—5,000 S3.
Black River—
Sheffield Lake—5,000 S5.
LaHave River—
Butler Lake Brook—10,000 S2.
Hardwood Lake—10,000 S4.
Lake Paul Stream—10,000 S4.
Twin Lakes—2,000 S5.
Minas Basin—
Bass Creek—17,080 S1, 5,000 S3.
Mill Creek—5,000 S4.
Pereau Creek—17,080 S1, 5,000 S3, 5,000 S4.
North Mountain Stream—700 S2.

Hants County
Avon River—
Armstrong Lake—5,000 S5.
Card Lake—10,000 S5.
Hensell Brook—19,728 S1.
Little Otter Lake—10,000 S4
North Canoe Lake—10,000 S4.
Shey Lake—5,000 S4.
Kennetcook River—
Cogmagun River—3,000 S5.
Valley Lake—5,000 S5.
Palmer Lake—5,000 S5.
Cameron Lake (North R.)—5,000 S5.

Queens County—
Mersey River—
Baxter's Brook—19,728 S1.
Cannon Brook—16,440 Sd.
Four-mile Brook—13,152 Sd.
Eleven-mile Brook—12,600 Sd.
Liverpool Brook—12,600 Sd.
McGinty Brook—14,795 Sd.
Minards Brook—19,728 S1.
Pike Brook—12,600 Sd.
Rogers Brook—19,278 S1.
Seven-mile Brook—15,750 Sd.
Sweeney Brook—13,152 Sd.
Medway River—
Mount Merit Brook—16,440 Sd.
Pollock Lake Brook—16,440 Sd.
Pretty Mary Lake Brook—16,440 Sd.
Scotts Lake Brook—17,260 Sd.

Halifax County—
Ingram River—10,000 Af.
Lake Eagle (Gammon Lake)—6,000 S5.
Musquodoboit River—10,000 Af.

Annapolis County—
Skin Lake (Mersey)—9,860 Sd.

Coldbrook Fish Culture Station Conc.

Annapolis County (Cont.)—
Mahoney Brook—19,728 S1.
Fred Lake—300 Sf.

Lunenburg Country—
Avon River—
Clearwater Lake—6,000 S5.
East River—13,450 Af.
Bezanson Lake—5,000 S5.
Mill Lake—5,000 S5.
Rocky Lake—5,000 S5.
Gold River—16,900 Af.
Duck Lake—5,000 S5.
Harris Lake—7,000 S4.
Horseshoe Lake—7,000 S4.
Howell Lake—7,000 S4.
Indian Lake—10,000 S4.
Lewis Lake—10,000 S4.
Lake Ramsay—7,000 S4.
Round Lake—7,000 S4.
Seffern Lake—7,000 S4.
Trout Brook—19,728 S1.
Wallaback Lake—10,000 S4.
Whelan Lake—7,000 S4.
LaHave River—
Ash Brook—13,152 Sd.
Butler Lake—7,000 S4.
Cranberry Lake—3,000 S5.
Franey Lake—5,000 S5.
Kings Brook—9,864 Sd.
Gull Lake—7,000 S4.
Pear Lake—3,000 S5.
Rocky Lake—4,000 S5.
Sherbrooke Lake—4,000 S5.
Smiths Brook—13,152 Sd.
Varner Brook—9,864 Sd.
Whetstone Lake—4,000 S5.
Zinck Brook—9,864 Sd.
Middle River—
Bear Brook—19,728 S1.
Cress Lake—7,000 S4.
Halfway Brook—19,728 S1.
Millets Lake—6,000 S5.
Nine-mile Lake—5,000 S5.
Noonan Brook—19,728 S1.
Swinimer Brook—19,728 S1.
Whitney Lake—5,000 S5.
St. Croix River—
Panuke Lake—15,000 S5.

Speckled trout	1,074,076
Atlantic salmon	88,550
Total distributions	1,162,626

Grand Lake Fish Culture Station

Halifax County (*West*)—
Hosier River—
Black Point Lake—5,000 S2.
Lower Shelldrake Lake—5,000 S2.
Stillwater Lake—5,000 S2, 1,000 S4.
Hubbards Cove River—
Sawlor Lake—2,000 S4.
Brigley's Lake—2,000 S4.
Camp Lake—2,000 S4.
Caribou Lake—2,000 S4.
Little Kip Hill Lake—2,000 S4.
Deep Mountain Lake—2,000 S4.
Vinegar Lake—3,000 S4.
Skinner Lake—2,000 S4.
Quack Lake—1,000 S4.
Big Kip Hill Lake—1,000 S4.
Glen Margaret Bay—
Oak Hill Lake—2,000 S4.
Hackett's Cove—
Boutiliers' Lake—5,000 S2.
East River—
Five Island Lake—5,000 S2.
Taylor Lake—2,000 S4.
Shubenacadie River
Grand Lake—9,500 S2.
Marsh Lake—
Sandy Lake—5,000 S2.
Nine Mile River—
Half Mile Lake—5,000 S1.
Pennant River—
McGrath's Lake—5,000 S1.
Ragged Lake—
Moody Lake—5,000 S1.
Hand Lake Brook—
South Lake—1,000 S4.
Long Lake—1,000 S4.
Kinsac River—
Tucker Lake—2,100 S4.
Sambro Harbour—
Third Pond—21,600 S1, 6,000 S4.
St. Margaret's Bay—
Cox Lake—2,000 S4.
Lewis Lake—2,000 S4.
Patent Ross Lake—2,000 S4.
North West Arm—
Chocolate Lake—1,000 S4.
Williams Lake—2,000 S4.

Halifax County (*East*)—
Sheet Harbour—
Anti Dam—4,000 S4.
Marshall Falls—2,000 S4.
Beaver Dam Lake—3,000 S4.
Lily Lake—2,000 S4.
Grand Lake—3,000 S4.
Cat Hill Lake—1,500 S4.
Half Way Brook—2,000 S4.
Musquodoboit River—
Cooks Lake—3,000 S2.
Gibraltar Lake—3,000 S2.
Lake Egmont—7,000 S2.
Mill Lake—4,000 S4.
Lindsay Lake—4,500 S4.
Pace Lake—2,000 S4.
Loon Pond—2,000 S4.
Lay Lake—3,000 S2.
Tangier River—
Third Lake—2,000 S4.
Fourth Lake—2,000 S4.
Bear Lake—2,000 S4.
Long Lake—7,000 S2, 2,000 S4.
Scraggy Lake—7,000 S2.

Grand Lake Fish Culture Station—Conc.

Halifax County [*East*] (Cont'd.)—
Tangier River—(Cont'd.)
River Lake—7,000 S2.
Shellbird Lake—2,000 S4.
Salmon River—
Pine Lake—21,600 S1, 6,000 S4.
Porcupine Lake—21,600 S1, 6,000 S4.
Granite Lake—21,600 S1, 6,000 S4.
Lake Charlotte—
Higgins Lake—7,000 S2.
Abraham Lake—2,500 S4.
Porters Lake—
Cousins Lake—10,000 S1.
Jessie's Little Lake—500 S4.
Lawrencetown Head—
Echo Lake—2,100 S4.
Goose Lake—2,100 S4.
Mineville Waters—
Cole Harbour Lake—21,600 S1, 6,000 S4.
Eagle Lake—2,100 S4.
Port Dufferin—
River-Quoddy Island—
Nowlan's Lake—4,000 S4.
Spar Lake—4,000 S4.
Goose Pond—3,000 S4.
Gammonds Pond—2,000 S4.
Mitchell Bay—
Hartlings Lake—3,000 S4.
Clam Bay—
Grassy Lake—2,000 S4.

Hants County—
Shubenacadie River—
Withrow Lake—2,000 S4.
Maitland Mill Pond—2,000 S4.
Lewis Lake—2,100 S4.
St. Croix River—
Cameron's Lake—4,000 S2.
Pigott Lake (Meander River)—3,000 S2.
Panuke Lake (or Ponhook L.)—2,000 S4.
Pockwock Lake—
West Lake—3,000 S2.
Avon River—
Kennetcook River—3,000 S4.
Indian River—
Uniacke Lake—2,100 S4.
St. Croix River—
Coxcomb Lake—2,100 S4.

Colchester County—
Stewiacke River—
DeBay's Pond—1,000 S1.

Halifax County—
Shubenacadie River—
Grand Lake—5,000 A1.

Speckled trout	377,200
Atlantic salmon	5,000
Total distribution	382,200

Kejimkujik Fish Culture Station

Annapolis County—
Annapolis River—23,460 Af.
Black River—4,079 Af.
South Branch—4,425 Af.
Round Hill River—7,678 Af, 20,000 A3.
Evans Brook—20,000 A1, 20,700 A2.
LaHave River—
Springfield Lake Brook—36,750 A1, 16,150 A2.
Sixty Brook—23,205 A1.
Kejimkujik Lake—1,140 Bf.
Dukeshire's Brook—10,810 B2.
Fairy Lake Brook—14,508 B2.
Heber's Meadow Brook—14,508 B2.
Little River—9,672 B2.
Mount Tom Brook—8,463 B2.
Nixon's Meadow Brook—21,150 B2.
Roger's Brook—5,240 B2.
West River Brook—12,090 B2.
Thomas Meadow Brook—26,000 B2.

Kings County—
Annapolis River—3,360 Af, 20,700 A2, 8,500 A3, 5,000 A4.
Black River—18,000 A2.
South Branch—4,400 Af, 20,700 A2, 8,500 A3.
LaHave River—
Sherbrooke Lake Brook—16,150 A2.

Lunenburg County—
LaHave River—41,933 Af, 16,150 A2, 29,766 A4.
Ash Brook—24,000 A1, 20,000 A3.
Church Lake Brook—24,000 A1.
Franey Lake Brook—10,000 A1.
Forty Brook—10,000 A1.
Hyson Brook—8,000 A1.
Mader Brook—16,000 A1.
North Branch—3,002 Af.
North River—12,750 A1.
Ohio River—16,796 A2.
Timber Lake Brook—20,700 A2.
West Branch—3,100 Af.
East River—10,400 A4.
Gold River—20,700 A2, 20,000 A4.

Halifax County—
Hubbards River—
Brigley Lake Brook—2,964 Af, 20,700 A2.
Sawlor Lake—5,337 Af, 9,310 A4.
Ingram River—20,700 A2, 8,450 A4.

Queens County—
Kejimkujik Lake—1,050 Bf.
Cranberry Brook—14,508 B2.
Grafton Brook—28,978 B2.
Snake Lake Brook—9,672 B2.

Atlantic salmon	656,515
Brown trout	177,789
Total distribution	834,304

Cape Breton County—
Atlantic Ocean—
Mira River—2,800 Bf, 577 Bk.
Big Pond (Florence)—3,000 S5.
Boulardrie—
Round Lake—1,500 S5.
East Bay—
Gillies Lake—28,500 S2.
Fourchu Bay—
Gabarus Lake—19,350 S3, 10,000 Sf.
Framboise River—
Giant Lake—13,000 S2, 3,000 S4.
Gabarus Bay—
Levers Lake—76,000 R1, 59,000 R4, 2,300 R5, 7,350 Rf, 48 Rh.
Chain Lake—19,350 S3.
Long Lake—19,350 S3.
MacIntyre Lake—19,350 S3.
MacLeod's Lake—19,350 S3.
George's River—
Scotch Lake—800 Sf.
Glace Bay—
Silver Lake—6,000 S4.
Grand Mira—
Currie Lake—19,350 S3.
Leitches Creek—
Jackson's Lake—17,000 S3.
Lingan Bay—
Kilkenny Lake—100,000 B2, 86,500 B3.
North West Brook—234,307 B1, 100,000 B2, 16,000 B3.
South West Brook—100,000 B1, 41,500 B3.
Louisburg Harbour—
MacIntyre Lake—19,350 S3.
MacMillan Lake—10,000 S3.
Stewart Lake—8,000 S4.
Main a Dieu—
Bruen Pond—10,000 S3.
Mira Bay—
Catalogne Lake—26,500 S2.
Loon Lake—10,000 S3.
MacDonald Pond—10,000 S3.
Mira River—
Cochran Lake—11,000 S3.
Cranburry Lake—10,000 S3.
Gaspereaux River—100,000 B1, 150,000 B2, 61,500 B3.
MacInnes Lake—19,350 S3.
Salmon River—82,500 B1, 50,000 B2, 41,000 B3.
North Sydney—
Pottles Lake—13,000 S3.
Port Morian—
Morrison Lake—5,000 S4.
Sydney Harbour—
Grand Lake—15,000 S2.
Power Lake—10,000 S4.
Wentworth Park—1,000 Sf.
Sydney River—
Blackett Lake—28,500 S2, 3,000 S4.
Dutch Brook Lake—5,000 S4.
Front Lake—12,500 S3.

Richmond County—
Atlantic Ocean—
Bras D'Or Lake—4,023 Sg.
Ferguson Brook—9,000 S2.
St. Esprit Lake—9,000 S2.
Black River—
Buchannan Lake—10,000 S2, 600 Sf.
Bras D'Or Lake—
Mary Ann Lake—10,000 S2.
Indian Lake—12,000 S2.
MacDonald Lake—18,000 S2.
MacKenzie Lake—6,000 S2.
MacNab Lake—6,000 S4.
Pringle Lake—10,000 S2.
Thompson Lake—10,000 S2.
Scott Brook—18,000 S2.
Falls Bay—
Breens Lake—10,000 S2.
Framboise River—
Bell Lake—6,000 S4.
Five Island Lake—14,500 S2.
Reed's Lake—4,500 S5.
Sterling Lake—12,500 S2.
Grand River—
Barren Hill Lake—18,000 S2.
Loch Lomond Lake—24,000 S2, 6,500 S4. 14,200 Sf, 300 Sg.
L'Ardoise—
Rockdale Lake—6,500 S2.
L'Archeveque Cove—
Ferguson Lake—24,000 S2.
Isle Madame—
Chain Lake—12,500 S2.
Deep Lake—8,000 S2, 300 Sf.
Grand Lake—15,000 S2, 6,000 S4, 1,000 Sf.
Latimore Lake—8,000 S2, 5,500 Sf.
Major's Pond—1,000 Sf.
Mannette Lake—8,000 S2.
Potties Lake—2,500 Sf.
Shaws Lake—3,200 Sf.
MacDonald Lake—
MacLeod's Brook—9,000 S2.
Straughton Brook—9,000 S2.
River Tillard—
Kyte's Lake—12,600 S2, 20,000 S3.
Lindloff Lake—58,000 S1, 20,000 S4, 11,600 Sf.
Mill Lake—30,000 S2.
St. Peter's Bay—
River Tillard—40,000 S2.
West Arichat—
Campbell Pond—12,500 S2.
West Bay—
Black River—20,000 S2.

Inverness County—
Strait of Canso—
Brawley Lake—5,000 S2.
MacIntyre Lake—2,500 S5.
Pleasant Hill Lake—5,000 S2.

Halifax County—
Shell Drake Lake—1,000 Sf.

Cape Breton Highland National Park—
Clyburn Brook—3,000 Sf.
Fresh Water Lake—3,000 Sf.

Cape Breton Highland National Park (Cont'd.)
Jigging Cove—2,000 Sf.
Mary Ann Brook—1,000 Sf.
Warren Lake—10,000 Sf.

Brown trout	1,166,684
Rainbow trout	144,698
Speckled trout	1,035,923
Total distribution	2,347,305

Margaree Fish Culture Station

Inverness County—
Atlantic Ocean—
Bras D'Or Lakes—
Blue's Brook—12,900 S1.
Middle River Headwaters—12,000 S1.
Narrows Pond—300 Sg.
Little Narrows Pond—2,000 S3, 500 Sf.
River Dennys—8,640 S1, 7,000 S3.
Big Brook—12,960 S1, 4,150 S3.
Diogenes Brook—12,960 S1, 6,000 S3, 300 Sf.
MacLellan Brook—8,640 S1.
River Inhabitant—
MacPherson Brook—18,000 S1.
Rough Brook—18,000 S1, 5,000 S3, 300 Sf.
Skye Brook—24,000 S1, 2,000 S3.
Brigend Brook—27,000 S1, 2,000 S3.
Gulf of St. Lawrence—
Broad Cove River—43,200 S1, 4,000 S3, 2,352 S5.
Catholic Brook—15,000 S1, 3,000 S4.
Corney Brook—1,500 Sf.
Cheticamp River Estuary—506 Sg, 1,837 Sh.
Cheticamp River—34,000 Ac
Cheticamp Lake—1,000 Sf.
Dunvegan Brook—15,000 S1, 3,000 S4.
Eustabes Pond 400 Sf.
Farm Brook—35,250 S1.
Fisset Brook—35,250 S1.
Grand Etang Brook—12,000 S1.
Pembroke Lake—6,000 S3.
Grand Lac—11,150 S3, 800 Sf.
Jumping Brook—
French Mountain Lake—1,500 Sf.
Mabou River—
Mull River—34,000 Ac.
Margaree River Estuary—1,362 Sg. 139 Sh.
Margaree River—
Gallant River—20,000 S1, 5,700 S3.
N.E. Margaree River—654 Sf, 1 Sg. 2 Sh, 3,570 Ad.
Big Brook—21,600 S1, 3,000 S3, 588 S5.
Carmichaels Brook—9,400 Sd.
Carrolls Pond—284 Sf.
Coadys Brook—9,400 Sd.
Ethridge Brook—800 S4.
Forest Glen Brook—14,100 Sd, 5,400 S3, 200 Sf.
Harts Brook—9,400 Sd.
Hedges Pond—99 Sf.
Ingraham Brook—18,800 Sd, 10,800 S3, 224 Sf, 36 Sh.
MacLeod Brook—100 Sf.
Margaree River—
N.E. Margaree River cont'd.—
Island Brooks—14,100 Sd.
Lake O Law Brook—2,500 S3, 24,500 A1.
Lake O Law Lakes—7,500 S3, 3,500 Sf.
MacPherson Brook—9,400 Sd, 100 Sf.
Marsh Brook—18,800 Sd, 3,000 S3.
Mill Brook—12,960 S1, 1,500 S4.
Murray Brook—9,400 Sd.
Nile Brook—12,000 S1, 6,000 S3, 24,500 S1.
Schoolhouse Brook—700 S4.
Stewart Brook—9,400 Sd, 2,000 S4.
Timmins Brook—1,500 S4.
Tomkins Brook—12,960 S1, 2,700 S3, 588 S5.
Watson Brook—10,800 S1.
Scotch Hill Brook—10,800 S1, 2,700 S3.
S.W. Margaree River—
Captain Allen Brook—12,500 Sd.
Collins Brook—12,500 Sd.
Lake Ainslie—
Mackay Brook—15,000 S1.
MacMillan Brook—12,000 S1.
Mt. Pleasant Brook—21,000 S1.
Petite Lac—200 Sf.
Port Hood Island Ponds—600 S4.
Red River Lakes—1,250 S3.
Strait of Canso—
Hector Lake—2,000 S3, 150 Sf.
Horton Lake—10,000 S3, 150 Sf.

Victoria County—
Atlantic Ocean—
Aspy Bay—
Giffin Lake—1,200 S3, 600 Sf.
Morrison Lake—1,200 S3, 600 Sf.
North Aspy River—3,000 Sf.
Wilkie Brook—700 Sc.
Barachois River—14,100 Sd, 5,000 S3.
Bras D'Or Lakes—
Baddeck Bay Brook—9,400 Sd.
Baddeck River Estuary—292 Sg.
Baddeck River—13,150 S3, 2,352 S5.
Adelaide Brook—9,400 Sd.
Big Farm Brook—9,400 Sd.
Donald MacGinnis Brook—9,400 Sd.
Farquar Angus Brook—14,000 S1.
Foyle Brook—9,400 Sd.
Harris Brook—1,176 S5.
MacRae Brook—14,100 Sd.
New Glen Brook—18,000 S1, 2,500 S3.

Margaree Fish Culture Station—Conc.

Victoria County (cont'd.)—
Atlantic Ocean cont'd.—
Bras D'Or Lakes—
Baddeck River cont'd.—
Peters Brook—20,000 S1, 5,000 S3, 600 Sg.
Rice Brook—9,400 Sd.
Garys Pond—3,000 S3.
Humes River—18,000 S1.
Middle River—53,600 Ac.
Indian Brook—9,000 Sd, 2,000 S3.
Black Brook—2,000 S3.
Douglas MacRae B.—14,000 S2.
Mackenzie Brook—9,000 Sd.
Leonard MacLeod Brook—18,000 S1, 2,000 S3.
Cold Brook—15,000 Sd.
Fraser MacDonald B.—14,000 S2.
MacLeod Lake—2,000 S3, 300 Sf.
Morrison Brook—15,000 Sd, 2,500 S3.
Willie Dannies B.—18,000 S2.
New Harris Pond—1,500 S3.
Washabuck River—15,000 S1.
Breton Cove Pond—2,500 S3.
Burton Lake—700 S3.
Dalem Lake—4,000 S3.
Dingwall Lake—1,000 S3, 600 Sf.
MacDonald Pond—2,500 S3.
Paquette Lake—1,000 Sf.
Patterson Lake—3,000 S3.
St. Anns Bay—
Campbells Pond—1,500 S3.
North River—20,400 Ac.
Church Brook—9,400 Sd, 2,000 S3.
White Point Pond—700 S3.

Speckled trout	1,141,712
Atlantic salmon	136,070
Total distribution	1,277,782

Mersey Fish Culture Station

Queens County—
Atlantic Ocean—
Five Rivers—5,000 S1.
McAlpine Brook—5,000 S2.
Mitchell Brook—5,000 S1.
Granite Village Brook—5,280 S2.
Port Joli Harbour—
Louis Lake—3,108 S4.
Liverpool Bay—
Herring Cove Lake—12,000 S2.
Beach Meadows Brook—2,250 S2.
Blueberry Pond—11,004 S3.
Mersey River—15,000 S3.
Medway River—96,000 A1, 97,125 A3, 16,215 A4.
Christopher Lakes—21,120 S2.
Russell Lake—5,280 S2.
Salters Brook—4,500 S2.
Wentworth Brook—5,280 S2.
Twelve Mile Brook—5,280 S2.
Fifteen Mile Brook—5,280 S2.
Dean Brook—5,280 S2.
Buggy Hole Brook—5,280 S2.
Crane Lake & Brook—32,100 S3.
Humtagut Creek—5,280 S2.
Mersey River—90,300 B2, 36,462 B4.
Barr Pond—5,000 S2.
Ten Mile Lake—10,000 S2, 11,004 S3.
Ponhook Lake—
LaBelle Brook—7,500 S2.
Wildcat River—11,250 S2.
Path Lake—6,000 B4.

Lunenburg County—
Medway River—
Island Lake—10,000 S1.
Spectacle Lake—10,000 S1.
Crooked Lake—10,000 S1.
Petite Brook—4,500 S2.
Horse Lake—4,000 S4.
Manthorne Lake—1,000 S4.
Petite River—
Chinaman's Lake—2,250 S2.
John's Pond—2,000 S4.
Square Bridge Brook—6,000 S2.
Browns Branch Brook—5,000 S2.
Wallace Brook-Lake—6,000 S2, 2,500 S4.
Kaulback's Lake—6,000 S2.
Perinettes Brook—5,000 S2.
Moose Lake—9,000 S2.
LaHave River—
Rhodenizer Lake—9,000 S2.
Crouse Lake—7,000 S2.
Russell's Pond—1,500 S4.
Atlantic Ocean—
Sperry Lake—6,000 B4.
Stage's Pond—11,004 S3.
Frog Pond—3,668 S3.
Crab Pond—7,360 S3.
Romkey's Pond—1,500 S4.
Rhynart Lake—1,000 S4.
Hirtle's Pond—1,500 S4.
Beaver Brook—10,000 S2, 2,000 S4.
Green Bay—
Petite River—20,000 A1, 12,600 A4.
Mahone Bay—
Mushamush River—20,000 A1, 12,690 A4.

Shelburne County—
Green Harbour—
Green Harbour Lake—33,120 S2.
Sable River—
Tom Tigney River—20,000 S1.
Wall Lake—
Wall Lake Brook—8,800 S2.

Speckled trout	403,778
Brown trout	138,762
Atlantic salmon	274,630
Total distributions	817,170

Middleton Fish Culture Station

Annapolis County—
Annapolis River—8,000 S2, 8,000 S3.
Bloody Creek—6,000 S3.
Boot Lake—6,000 S3.
Cranberry Lake—2,400 S3.
Eleven Mile Brook—2,000 S3.
Foster Lake—10,000 S3.
Fisher Lake—6,000 S3.
Gates Brook—16,400 Sd.
Morton Brook—16,400 Sd, 5,000 S3.
Neilley Brook—8,200 Sd.
Nictaux River—20,000 S3.
Paradise Brook—6,000 S3.
Paradise Lake—10,000 S3.
Parker Brook—16,400 Sd, 16,000 S3.
Phinney Brook—16,400 Sd.
Slocom Brook—20,500 Sd, 5,000 S3.
Wrights Lake—15,528 S2.
Walker Brook—20,500 Sd, 10,000 S3.
Wiswal Brook—16,400 Sd.

LaHave River—
Lake Pleasant—10,000 S2, 8,000 S3.
Sixty Brook—10,000 S3.
Thirty Lake—10,000 S2.
Springfield Lake—10,000 S3.
Twin Lakes—6,000 S3.

Bear River—
Baillie Lake—15,000 S1.
Beeler Lake—8,000 S2.
Caty Lake—15,000 S1.
Lake Mulgrave—8,000 S3.
Nigger Line Brook—16,400 Sd.
Power Lot Brook—16,500 Sd.
Sundown Lake—8,000 S3.
Upper Mink Lake—8,000 S3.

LeQuille River—
Grand Lake—15,000 S1.
Gibson Lake—15,528 S2.
Lake LaRose—15,000 S1.
Matthews Lake—10,000 S3.
Mickey Hill Brook—15,000 S1.
Munroe Lake—4,000 S3.
McLellan Brook—2,000 S3.
Ten Mile River—15,000 S1.

Medway River—
Long Lake—10,000 S3.
Lake Alma—8,000 S3.
Red Lake—3,500 S3.
View Lake—4,000 S3.
Wildcat Brook—3,000 S3.

Nictaux River—
Benjamin Lake—10,000 S3.
Little River—6,000 S3.
NewCombe Brook—2,000 S3.
Private Brook—8,000 S3.
Pretty Mary's Lake—4,000 S3.
Quilty Lake—20,500 Sd, 10,000 S3.
Rodgers Brook—2,000 S3.
Scrag Lake—20,000 S2.
Shannon River—16,000 S1, 10,000 S3.
Trout Lake—18,000 S3.
Trout Brook—20,500 Sd.
Waterloo Lake—16,000 S1.
Wamboldt Lake—5,000 S3.
Zwicker Lake—10,000 S3.

Bay of Fundy—
Milbury Lake—8,000 S2.
Sand Lake—8,000 S3.
Webber Lake—10,000 S3.
Youngs Lake—8,000 S2.
Sandy Bottom Lake—
Medway—8,000 S3.

Kings County—
Annapolis River—
Fales Stream—16,400 Sd, 8,000 S3.
Zeke Brook—16,400 Sd.
Medway River—
Spectacle Lake—15,000 S1.
LaHave River—
Armstrong Lake—15,508 S2.
Burke Lake—6,000 S3.
Chain Lake—10,000 S3.
Donnelan Lake—10,000 S3.
Lake Paul—8,000 S3.
Lake Terment—8,000 S3.
Mack Lake—15,000 S1.
Mistake Lake—10,000 S3.
North Twin Lake—8,000 S3.
Spry Lake—8,000 S3.
South River Lake—8,000 S3.
Shell Camp Lake—10,000 S3.
Twin Lakes—10,000 S3.
South Twin Lake—8,000 S3.
Upper Sixty Lake—8,000 S3.

Lunenburg County—
LaHave River—20,000 S2.
Blystone Lake—5,000 S3.
Birch Meadow Brook—2,000 S3.
Church Lake Brook—16,400 Sd,4,000 S3.
Demons Run—3,000 S3.
Farney Lake—3,000 S3.
Holbert Lake—2,300 S3.
Haley Lake—6,000 S3.
Hirtles Lake—5,000 S3.
Indian Lake Brook—16,400 Sd.
New Canada Lake—4,000 S3.
North River—10,000 S2.
Pear Lake Brook—12,300 Sd.
Oak Hill Lake—7,000 S3.
Rhyne Lake—7,000 S3.
Sherbrooke Lake—6,000 S3, 127,000 G2.
Gully Brook—12,300 Sd.
West Lake—3,000 S3.
Whetstone Lake—12,300 Sd.
Williams Lake—4,500 S3.
Zwicker's Brook—12,300 Sd.

Queens County—
LaHave River—
Covey Lake—16,400 Sd.
Franey Lake—12,300 Sd.
Randall Lake—20,500 Sd.
Medway River—
Collins Lake—3,000 S3.
Dollivers Lake—3,000 S3.
Freemans Lake—20,500 Sd, 5,000 S3.
Faders Brook—16,400 Sd.
Harmony Lake—16,400 Sd, 4,000 S3.
Henleys Brook—16,400 Sd.

Middleton Fish Culture Station—*Conc.*

Queens County (cont'd.)—
Medway River cont'd.—
Kempt Lake—3,000 S3.
Pernetts Brook—12,300 Sd.
Pollock Lake—3,000 S3.
Scotts Lake—3,000 S3.
Tupper Lake—3,000 S3.
Wildcat Brook—3,000 S3.
Mersey River—7,500 S3.
Beaver Head Lake—3,000 S3, 500 S3.
Minards Brook—7,500 S3.

Speckled trout	1,307,864
Lake trout	127,000
Total distribution	1,434,864

Yarmouth Fish Culture Station

Digby County—
Annis River—
Snarl Lake—16,000 B2, 8,000 B3, 11,000 B4.
Bear River—
Barnes Brook—4,000 S2.
Hill Lake—4,000 S2.
Lake Jolly—4,000 S2.
Lake LeMarchant—4,000 S2.
Morgan Brook—4,000 S2.
Belliveau River—1,000 S3.
Carleton River—36,000 S3.
Bear Lake Brook—3,000 S3.
Bill John L. Brook—4,000 S2.
Boar's Back Lake & Brook—4,000 S2.
Bullerwell's Brook—4,000 S2.
Briar Lake & Brook—4,000 S3.
Hourglass Lake—4,000 S2.
Hunter Lake—4,000 S1.
Klondyke Brook—4,000 S2.
Oliver Lake—1,000 S4.
Paul Lake Brook—4,000 S2.
Placide Lake—1,000 S3.
Payson's Meadow Brook—9,000 S3, 8,000 S2.
Porcupine Lake & Brook—4,000 S2.
Shingle Mill Brook—4,000 S2.
Seven P. Ha. Penny Brook—1,000 S4.
Sprague Lake—4,000 S2.
Sullivan Lakes—4,000 S2.
Wentworth Brook—5,000 S3.
Church Point Brook—1,000 S3.
Doctor's Lake—2,500 S3.
Gilbert's Brook—1,000 S3.
Grosses Coques River—12,000 S2.
Bartlett Lake & Brook—4,000 S2.
Mill Brook—4,000 S2, 3,500 S3.
Thibault Lake & Brook—4,000 S2.
Loud Lake Brook (Franklin R.)—4,000 S2.
Marshalltown Brook—4,000 S2.
Mavilett River—16,000 S1.
Acacia Brook—4,000 S2.
Meteghan River—
Arthur Lake—4,000 S2.
Anselem Lake—4,000 S2.
Bourneuf Lake & Brook—6,000 S2.
Blackadar Brook—3,500 S3.
Bonaventure Lake—3,500 S3.
Cranberry Lake—3,500 S3.
Comeau Lake (Conc. Rd.)—4,000 S2.
Comeau Lake (Factory)—3,500 S3.
Danvers Lake—4,000 S2.
Eel Lake—3,000 S3.
Gatien Thibault Brook—4,000 S2.
Griffith Lake & Brook—1,000 S4.
Loonfoot Lake—4,000 S2.
Long Lake (Hassett)—1,000 S4.
Long Lake (Margo Rd.)—4,000 S2.
Long Lake (Conc. Rd.)—4,000 S2.
Meteghan Lake (Victor)—4,000 S2.
Meteghan River (Hassett)—4,000 S2.
Meteghan River (East)—7,000 S3.
Meteghan River (Main)—4,000 S2, 15,000 S3.
Meteghan River Brook (Negro)—4,000 S2.
Margo River—4,000 S2.
Nowlan Lake—4,000 S2.
Negro Lake—3,500 S3.
Partridge Lake—4,000 S2.
Phillip Lake & Brook—4,000 S2.
Peter Lake—2,000 S3.
Prime Lake & Brook—1,000 S4.
Rocky Brook—4,000 S2.
Young's Lake—2,000 S3.
Salmon River—3,500 S3, 55,000 A1, 24,000 A2, 95,000 A3, 7,000 A5, 21,625 Af
Boney's Lake—6,000 S3.
Blackwater Brook—3,500 S3.
Clearwater Lake—3,500 S3.
Dean's Brook—4,000 S1, 3500 S3, 12,000 A2, 17,000 A3.
Doucett Lake (East)—3,500 S3.
English Lake—1,000 S4.
Farish Lake Brook—4,000 S1.
Gaspereaux Lake & Brook—8,000 S1.
Hectanooga Lake & Brook—4,000 S1, 6,000 S3.
Moosehorn Lake—3,500 S3.
Pierce Lake—2,500 S3.
Springdale Brook—2,500 S3, 12,000 A3.
Tickens Lake & Brook—8,000 S1.
Salmon River Lake—12,000 A3.
Silver River—10,000 S3.
Carrying Road Lake—3,000 S3.
Whistler Lake—3,000 S3.
Sissiboo River—10,000 S3.
Andrews Lake—1,500 S3.
Chub Lake—4,000 S2.
Dunbar Brook—4,000 S2.
Everett or Geo Lake—1,000 S3.
Hanes Lake—3,000 S3.
Journey Lake—4,000 S2.
Lint Lake (Wallace River)—4,000 S2.
Mallett Lake—3,000 S3.
Mistake Lake—4,000 S2, 3,000 S3.

Digby County (cont'd.)—
Sissiboo River cont'd.—
Mistake River—1,000 S3.
Wallace River—8,000 S2.
Wright Lake—4,000 S2.
Wagner's Lake (Flag)—1,500 S3.
Syda Lake (Acacia Brook)—4,000 S2.

Yarmouth County—
Allen Lake—3,500 S3.
Annis River—40,300 B1, 52,000 B2, 95,000 B3, 76,000 B4, 5,000 B5, 394 Bg. 485 Bh.
Annis River (Crosby Dam)—8,300 B1.
Annis River (Brenton Brook)—8,300 B1.
Annis River (Norwood Brook)—8,300 B1, 12,000 B2.
Annis Lake—12,000 B2, 9,000 B3, 7,000 B4, 5,000 B5, 500 Bf.
Annis Lake Brook—24,300 B1, 15,000 B2, 3,000 B3.
Brazil Lake Big—12,000 B2, 8,000 B3, 3,000 B4, 300 Bf.
Brazil Lake Brook—4,150 B1, 3,000 B3.
Brazil Lake Little—19,000 B2, 8,000 B3.
Brazil Lake Little Brook—4,150 B1.
Brenton Brook (Bull Hill)—8,000 B2.
Crosby Brook—4,150 B1, 8,000 B2.
Edward Lake & Brook—4,150 B1, 12,000 B2, 5,000 B3, 6,000 B4.
Ellenwood Lake—19,000 B2, 8,000 B3, 300 Bf. 8,000 B4.
Gardener's Mill Pond & Bk.—16,000 B1, 11,000 B2, 8,000 B3, 3,000 B4, 300 Bf.
Harris Lake & Brook—8,300 B1, 19,000 B2, 5,000 B3, 8,000 B4.
Hawley Road Brook—4,150 B1, 8,000 B2.
Hooper Lake—4,000 B2, 16,000 B3, 6,000 B4, 300 Bf.
Hooper Lake Brooks—8,300 B1.
Jessie Lake—12,000 B2, 3,000 B3, 8,000 B4, 300 Bf.
Pleasant Valley Brook—24,300 B1, 8,000 B2, 16,000 B3, 7,000 B4, 5,000 B5.
Pleasant Valley (Orchard)—4,150 B1.
Salmon Lake Brook—4,150 B1.
Salmon Lake—11,000 B2, 5,000 B3, 4,000 B4.
Saunder's Mill Brook—20,150 B1, 8,000 B2, 5,000 B3, 7,000 B4.
Scott Lake & Brook—12,000 B2, 5,000 B3, 5,000 B4.

Argyle River—3,000 S3, 59,000 A1, 10,000 A3, 12,500 Af.
Frost Pond—3,000 S3.
Moses Lake—3,000 S3.
Randall Lake—3,000 S3, 9,000 A3.

Beaver River—
Cedar Lake & Brook—5,000 S1.
Churchill Lake—2,500 S3.
Corning Lake South & Brook—5,000 S1.
Coggins Lake & Brook—5,000 S1.
Darlings Lake & Brook—5,000 S1.
Mallett's Lake & Brook—5,000 S1, 2,500 S3.
Porter Lake & Brook—5,000 S1.
Tedford Lake & Brook—5,000 S1.
Brenton Lake & Brook—5,000 S1.
Chegoggin River—8,000 S3.
Chegoggin Lake & Brook—5,000 S1, 4,000 S3.
Wellington Lake & Brook—5,000 S1.
Chebogue River—
Trefry's Lake—4,000 S2.
Carleton River—17,500 S3.
Bird Lake—2,500 S3.
Fanning Lake—4,000 S2.
Hamilton Lake—4,000 S2.
Hick's Brook—4,000 S2.
Nickerson's Brook—4,000 S2.
Richardson's Brook—4,000 S2.
Richardson's Lake—2,500 S2.
Ryerson's Brook—4,000 S2.
Sloane's Lake—2,500 S3.
Goose Lake Brook—1,000 S3.
Pubnico Lake—3,000 S3, 14,000 A3, 4,000 Af.
Salmon River—
Killam Lake—2,500 S3.
Lake George Brook—100,000 S3.
Winter's Lake—3,500 S3.
Silver River—15,000 S3.
Back Lake Brook—3,000 S3.
Burrell's Brook—3,000 S3.
Tusket River—25,000 S3, 94,000 A1, 9,000 Af.
Bear Brook—2,000 S3.
Beaver Lake—2,000 S3.
Big Meadow Brook—2,000 S3.
Butler's Lake—2,500 S3.
Canoe Lake & Brook—2,500 S3.
Clearwater Lake & Brook—4,000 S2.
Coldstream River—9,000 S3.
Gray's Brook—4,000 S2.
Harris Lake—2,000 S3.
James Lake—2,500 S3.
Kegeshook Lake—2,500 S3.
Louis Lake—2,000 S3.
Little Meadow Brook—4,000 S2.
Mespark Lake Brook—1,000 S3.
Mill Brook—2,500 S3.
Quinan River—21,000 S3, 75,000 A1.
Rushy Lake—2,000 S3.
Salter's Lake & Brook—4,000 S2.
Schoolhouse Brook—4,000 S2.
Soloman Lake—2,000 S3.
Sunday Lake—2,000 S3.
Welchard Brook—500 S3.
Wilson's Brook—500 S3.

Shelburne County—
Barrington River—30,000 A2, 5,000 Af, 12,000 S3.
Birchtown Brook—2,000 S3.
Black's Brook (Shel. Hbr.)—2,000 S3.
Churchover Lake Brooks—2,000 S3.
Clyde River—55,000 A1, 10,000 A2, 81,000 A3, 24,000 Af, 34,000 S3.
Bloody Creek—8,000 S3.
Goose Creek Big—2,000 S3.
Goose Creek Little—2,000 S3.
Hemlock Creek—31,000 A3, 1,000 S4.

Yarmouth Fish Culture Station—Conc.

Shelburne County (cont'd.)—
- Clyde River(Cont'd.)—
  - Hamilton Branch—5,000 A2, 37,000 A3, 8,000 S3.
  - MacDonald Creek—1,000 S4.
  - McGill Brook—11,000 A3, 1,000 S4.
  - Potter's Run—21,000 A3.
  - Purdy Hill Road Brook—1,000 S4.
  - Stalker's Run—1,000 S4.
- Downey's Brook—2,000 S3.
- Four Bridge Brook—3,000 S2.
- Oak Park Lake—2,000 S3.
- Purney's Brook—3,000 S2.
- Roseway River—5,000 S3.
  - Back (John) Lake—3,000 S2.
  - Beaver Creek—2,500 S2.
  - Black's Brook—2,000 S3.
  - Clam Creek—2,500 S3.
  - Deception Lake—6,000 S2, 3,000 S3.
  - Little Beech Hill Brook—2,000 S3.
  - Logging Creek—2,500 S3.
  - Lower Ohio School Brook—2,000 S3.
  - McKay Lakes—5,000 S2, 2,000 S3.
  - Oak Hill Brook—2,000 S3.
  - Phillips Lake—3,000 S2.
  - Reid Hill Road Brook (Ryer)—1,000 S2.
  - Sucker Brook—3,000 S3.
  - Turtle Creek—2,500 S3.
  - Upset Falls Brook—2,500 S3.
  - White's Falls Brook—3,000 S3.
  - Woodworkers Brook—2,500 S3.
- Round Bay River—6,000 S2.
  - Beaver Dam Lake & Brook—6,000 S2.
- Sandy Point Brook—2,000 S2.
- Shag Harbour Brook—2,000 S3.
- Meadow Brook (McKay Lakes)—1,000 S2.
- Jordan River—10,000 A3.

Queens County—
- Big Robertson Lake—5,738 Bf.
- Mersey River—80,392 B1, 30,000 B2.
  - No. 1 Headpond—17,000 B1.
  - No. 2 Headpond—17,000 B1.
  - Deep Brook—17,000 B1.
  - Lower Great Brook—17,000 B1.
  - Upper Great Brook—17,000 B1.
  - Tenmile Lake—54,000 B1.

Speckled trout	992,500
Brown trout	1,107,609
Atlantic salmon	862,125
Total distribution	2,962,234

NEW BRUNSWICK

Charlo Fish Culture Station

Restigouche County—

- Chaleur Bay—
  - Antinori Lake—4,000 S3.
  - Black Lake—2,000 S4.
  - Black and Salt Lake—3,000 S2.
  - Goulette Brook—1,000 S3.
  - Jacquet River—206,300 A1, 39,000 A2, 5,640 Af.
  - Jacquet River Head—2,000 S4.
  - Louison River (Nash Creek)—30,000 S1, 4,000 S3.
  - Louison River (Blackland)—1,000 S3.
  - Lily Lake—1,000 S1.
  - Portage Lake—600 Sf.
  - N.B. Charlo River—87,500 A1, 3,000 Af.
  - N.B. Charlo River (Dam)—750 Sf.
  - Nash Creek—30,000 S1, 4,000 S3.
  - S.B. Charlo River—14,000 S1, 155 Sf.
  - Tetagouche Lake—7,200 S3.
  - Walker Brook—33,000 S1.
- Christopher Brook—30,000 S1, 5,000 S3.
  - Black Brook—2,500 S3, 30,000 S1.
  - Sharps Lake—600 Sf.
  - Loch Lomond Lake—2,000 S2.
  - Belldune River—4,000 S3.
- Eel River—30,000 S1.
  - Coldwell Lake—2,307 S3.
  - Robinson Lake—190 Sg.
- Kedgwick River—184,000 A1, 36,900 A2, 10,780 Af.
  - Eight Mile Lake—4,000 S3.
  - Meadow Brook—118,800 A1, 36,000 A2, 5,140 Af.
  - Meadow Brook Lake—2,000 S3.
  - Gounamitz River—68,310 A1, 30,000 A2, 5,640 Af.
  - Gounamitz Lake—300 Sf.
- Restigouche River—210,500 A1, 18,180 Af.
  - Cheaters Brook—1,530 S3.
  - Five Finger Brook—4,000 S3, 6,000 S4.
  - Hales Brook—8,000 S3.
  - Little Main River—147,000 A1, 36,000 A2, 9,057 Af.
  - Two Brook Lake—2,000 S3.
  - White Brook—2,000 S4.
- Upsalquitch River—
  - Burntland Lake—600 Sf.
  - Grog Brook—2,000 S4.
  - Gordons Gulch Brook—1,530 S3.
  - Island Lake—300 Sf.
  - Murray Lake—6,000 S3.
  - Murray Lake—1,000 S2
  - MacKenzie Lake—3,200 S3.
  - N.B. Berry Brook—1,530 S3.
  - N.W. Upsalquitch River—199,500 A1, 30,000 A2, 5,000 Af.
  - Reids Gulch Brook—1,530 S3.
  - Ritchie Brook—1,600 S3.
  - S.B. Berry Brook—1,530 S3.
  - S.E. Upsalquitch River—209,500 A1, 30,000 A2, 5,640 Af.
  - Tongue Lake—1,526 S4.
  - Twenty-one Mile Lake—3,060 S3.
  - Popelogan River—2,000 S3.

Charlo Fish Culture Station—Conc.

Gloucester County—
Chaleur Bay—
Clarniere Lake—5,530 S3.
Elmtree River—30,000 S1, 3,000 S4.
Millstream River—30,000 S1, 3,000 S4.
N.B. Caraquet River—123,000 A1, 5,000 Af.
S.B. Caraquet River—7,200 S3.
Nipisiquit Bay—
Bass River—118,800 A1, 4,170 S3.
Pokemouche River—5,142 S4, 520 Sf.
Tetagouche River—80,000 A1, 30,000 A2, 10,640 Af.
Tracadie River—200,500 A1, 10,640 Af.
Nipisiquit River—30,000 A2, 11,280 Af.
Canoe Landing Lake—1,530 S3.
Forty Mile Brook—2,000 S4, 2,660 S3.
Forty-four Mile Brook—2,000 S4, 2,660 S3.
Gordon Brook—75,000 A1.
Middle River—75,000 A1.
Nine Mile Brook—2,000 S4, 2,660 S3.
S.B. Forty Mile Brook—5,364 S3.
Sole Leather Lake—3,600 S3.
Strawns Lake—3,600 S3.

Atlantic salmon	2,507,247
Speckled trout	418,174
Total distribution	2,925,421

Florenceville Fish Culture Station

Carleton County—
Becaguimec River—
Brummagen Brook—4,500 S3.
Burntland Brook—12,000 S1.
Burlock Brook—9,000 S1.
N.Br. Becaguimec—12,000 S1, 3,280 S2.
Coldstream—16,500 Sd, 12,000 S1, 300 Sf.
Day Brook—9,000 S1.
Dickinson Brook—2,250 S3.
Dug Hill Brook—9,000 S1.
Gin Brook—6,000 S1.
Howard Brook—15,000 S1, 4,500 S3.
Beaver Brook—
Manse Brook—9,000 S1, 1,125 S3.
Coldstream—
Brown Brook—6,000 S1.
Black Brook—6,000 S1, 2,250 S3.
Beaver Brook—16,500 Sd, 2,250 S3.
Dry Brook—12,375 Sd, 1,125 S3.
Hartley Brook—16,500 Sd, 2,250 S3.
Hamilton Brook—12,375 Sd, 2,250 S3.
Markie Brook—8,250 Sd, 4,500 S3.
Scharrah Brook—2,250 S3.
Smith Brook—9,000 S1.
Eel River—
Bull Creek—9,000 S1.
Bedell Brook—33,000 Sd, 8,200 S2, 4,500 S3, 381 Sf.
Blowdown Brook—12,000 S1.
Crane Brook—9,000 S1.
Debec Brook—12,375 Sd, 2,250 S3.
McLeod Brook—6,000 S1.
Rosamond Lake—3,755 S4.
Sherwood Lake—127 Sf.
Gibson Creek—
Kilmarnock D'water—12,000 S1.
Lr. Guisiguit River—
John Clark Brook—3,280 S2.
John T. Brook—3,280 S2.
Meduxnekeag River—
Carter Brook—12,375 Sd.
Gartley Brook—1,000 S4.
Marven Brook—16,500 Sd, 3,280 S2, 2,250 S3.
McQuarrie Brook—4,920 S2.
Payson Lake—1,800 S4.
Monquart River—
Boyd Beaver Pond—225 Sf.
Cronin Beaver Pond—225 Sf.
Cuffman Brook—3,280 S2.
Holmes Brook—15,000 S1, 3,280 S2, 4,500 S3.
Higgins Brook—9,000 S1, 3,280 S2.
McCartney Brook—9,000 S1.
Smith Brook—12,000 S1, 3,280 S2.
Sol Grain Brook—15,000 S1, 3,280 S2, 2,250 S3.
S.W. Miramichi River—
Brandy Brook—12,000 S1, 1,125 S3.
Biggar Brook—12,000 S1, 1,125 S3.
Five Mile Brook—12,000 S1, 2,250 S3.
N.B. S.W. Miramichi R.—15,000 S1.
Four Mile Brook—12,000 S1.
Stewart Brook—6,000 S1.
S.B. S.W. Miramichi R.—
Argyle Pond—225 Sf.
Bogan Brook—16,500 Sd.
Ball Lake Brook—12,375 Sd.
Clearwater Brook—16,500 Sd, 2,680 S2.
Elliot Brook—15,000 S1, 2,680 S2, 450 Sf.
Harvey Brook—12,375 Sd, 2,680 S2, 2,250 S3.
Juniper Brook—15,000 S1, 2,680 S2.
Schoolhouse Brook—12,375 Sd, 1,125 S3.
Simpson Brook—12,375 Sd, 1,125 S3.
Little Teague Brook—15,000 S1, 2,680 S2, 225 Sf.
Big Teague Brook—15,000 S1, 2,680 S2, 225 Sf.
Little Presquile River—
Gallivans Brook—12,375 Sd, 1,640 S2.
Gowan Lake—3,280 S2.
Ketch Lake—7,500 S1, 200 Sf, 134 Sh.
Stairs Brook—8,250 Sd.
Williamstown Lake—1,640 S2, 400 Sf, 280 Sg, 100 Sh.
Big Presquile River—
Bradley Brook—12,375 Sd, 1,640 S2.
Burpee Brook—3,280 S2.
Carmichael Brook—3,280 S2.
Dingee Brook—12,375 Sd, 3,280 S2.
Davenport Brook—1,600 S4.
Hangman's Brook—3,280 S2.

Carleton County (cont'd.)—
- Big Presquile River (Cont'd.)—
  - Haines Brook—3,280 S2.
  - Harold Brook—12,375 Sd, 1,640 S2.
  - Mile Brook—12,000 S1.
  - Half Mile Brook—6,000 S1.
  - Two Mile Brook—15,000 S1.
  - Payson Brook—1,600 S4.
  - Pryor Brook—8,250 Sd, 3,280 S2.
  - Stewart Brook—15,000 S1.
- Saint John River—
  - Acker Creek—12,000 S1, 4,500 S3.
  - Bennett Lake—15,000 S1.
  - Bull's Creek—8,250 Sd, 15,000 S1, 2,250 S3, 127 Sf.
  - Buttermilk Creek—9,000 S1, 2,250 S3.
  - Barker Brook—15,000 S1.
  - Becaguimec River—24,000 S1.
  - Clark's Pond—15,000 S1.
  - Curtis Brook—1,800 S4.
  - Downey Brook—9,000 S1.
  - Deep Brook—12,000 S1, 4,500 S3.
  - Fern Brook—1,800 S4.
  - Up. Guisiguit River—16,500 Sd, 5,360 S2. 4,500 S3, 200 Sf.
  - Lr. Guisiguit River—16,500 Sd, 5,360 S2, 2,250 S3, 200 Sf.
  - Gibson Millstream—18,000 S1, 1,800 S4.
  - Hardwood Creek—6,750 S3.
  - Kilpatrick Brook—8,250 Sd, 1,125 S3.
  - Lanes Creek—3,280 S2, 2,250 S3.
  - Lily Brook—15,000 S1.
  - Monquart River—15,000 S1, 3,280 S2, 600 Sf, 260 Sg.
  - Olmstead Brook—8,250 Sd, 1,125 S3.
  - Lt. Presquile River—10,500 S1.
  - Big Presquile River—33,000 S1, 3,280 S2, 225 Sf.
  - River de Chute—16,500 Sd, 5,360 S2, 4,500 S3, 200 Sf.
  - Stickney Brook—24,000 S1, 4,050 S3, 3,600 S4.
  - Smith Brook—6,000 S1.
  - L. Shikatehawk River—9,000 S1.
  - Shikatehawk River—600 Sf.
  - White Marsh Brook—9,000 S1, 450 Sf.
- Shikatehawk River—
  - Birmingham Brook—9,000 S1.
  - Green Brook—12,000 S1.
  - Laing Brook—9,000 S1.
- Hatheway Brook—9,000 S1, 2,700 S3.
- Reed's Lake—1,600 S4.
- Waugh Brook—6,000 S1, 1,350 S3.
- Bay of Fundy—
  - Saint John River—1,036 Ag, 250 Ag.
- S.W. Miramichi River—
  - S.B. S.W. Miramichi R.—45,275 A1.
  - N.B. S.W. Miramichi R.—42,675 A1, 26,100 A2, 1,270 Af.
- Saint John River—
  - Becaguimec River—33,000 A1, 24,300 A2, 36,000 A3.
  - Meduxnekeag River—80,000 Ad.
  - B. Presquile River—51,750 Ad, 33,000 A1, 46,350 A2.
  - Shikatehawk River—86,250 Ad, 26,100 A2, 72,000 A3, 5,500 Af.

York County—
- Becaguimec River—
  - Indian Brook—9,000 S1.
- Cranberry Brook—
  - Charlie Lake—
    - Jamieson Lake—2,250 S3.
- 1st Eel Lake—
  - Dead Brook—9,000 S1.
- 2nd Eel Lake—
  - Mistake Brook—6,100 S2.
- 3rd Eel Lake—
  - Riley Brook—5,360 S2.
- Eel River—
  - Dow Brook—8,040 S2.
  - Four Mile Brook—2,680 S2.
  - Howard Lake Brook—2,680 S2.
  - Risteen Brook—9,000 S1.
  - Trout Brook—2,680 S2.
- Fifth Lake—
  - North Brook—6,100 S2, 4,500 S3.
- Indian Brook—
  - Indian Lake—3,280 S2, 2,400 S4, 635 Sf, 60 Sg, 25 Sh.
- Keswick River—
  - Dan's Brook—7,400 S1, 1,600 S3.
  - Green Hill Lake—14,800 S1, 3,280 S2, 60 Sg, 25 Sh.
  - Jones Forks—29,600 S1, 7,320 S2, 3,200 S3.
  - Mill Brook—11,100 S1, 1,600 S3.
  - North Forks—4,020 S2.
  - Whites' Brook—14,800 S1, 3,660 S2.
  - Woodland Lake Outlet—7,400 S1.
- Magaguadavic Lake—
  - Davis Brook—25,900 S1, 1,525 S2, 1,600 S3.
- Magaguadavic River—
  - Costello Brook—14,800 S1.
  - Harvey Lake—4,800 S3.
  - N.E. Magaguadavic R.—14,800 S1.
  - McCallum Brook—1,600 S3.
  - Trout Brook—11,100 S1, 1,600 S3, 1,800 S4.
  - Oliver Brook—11,100 S1, 1,600 S3.
- Mactaquac River—
  - Jackson's Brook—7,400 S1.
  - Meadow Brook—1,600 S3.
- Modsley Lake—
  - White Beaver Brook—11,100 S1, 4,575 S2, 1,800 S4.
- Nashwaaksis River—
  - Kingsley Brook—3,660 S2.
- Nashwaak River—
  - Cross Creek—4,800 S3.
  - Cathel Brook—9,000 S1, 1,600 S3.
  - Dunbar Brook—2,250 S3.
  - L. Doughboy Brook—1,800 S4.
  - B. Doughboy Brook—1,800 S4.
  - Flewelling Brook—6,000 S1.
  - Grand John Brook—1,600 S3.
  - Killarney Lake—3,660 S2, 2,250 S3, 70 Sg.
  - Limekiln Brook—9,000 S1.
  - McBean Brook—9,000 S1.
  - McCallum Brook—9,000 S1.
  - Middle Brook—9,000 S1.
  - 5 Mile Brook—3,200 S3.

Florenceville Fish Culture Station—Conc.

York County (cont'd.)—
Nasswak River—(Cont'd.)
Nashwaak Lake—75 Sg, 75 Sh.
Lr. Nashwaak Lake—75 Sg, 75 Sh.
Pigeon Brook—9,000 S1.
Ryan Brook—6,000 S1.
Sands Brook—6,000 S1.
Schoolhouse Brook—9,000 S1.
Seymour Brook—11,100 S1.
Thomas Brook—11,100 S1.
Tinkettle Brook—7,400 S1, 2,250 S3.
Tay River—3,850 S3.
West Brook—1,800 S4.
Nackawic River—
Fiddle Brook—3,280 S2, 800 S4.
Indian Brook—3,280 S2.
Taffy Lake—3,280 S2, 1,600 S4.
Oromocto River—
Yoho Stream—1,600 S3.
Palfrey Brook—
Lacoute Brook—6,100 S2.
Skiff Lake—1,235 Sf.
Palfrey Lake—
Palfrey Brook—2,250 S3.
Pokiok River—
Davidson Lake—635 Sf.
Lake George Lake—9,000 S3.
Passamaquoddy Bay—
Magaguadavic River—3,200 S3, 1,800 S4, 75 Sg, 75 Sh.
Shogomoc River—
Charlie Lake—6,750 S3, 635 Sf.
Skiff Lake—
Mud Lake—5,360 S2.
Sucker Brook—6,000 S1, 5,360 S2.
Spednik Lake—
Bolton Lake—400 Sf.
Casey Brook—2,250 S3.
Musquash Lake—200 Sf.
McAdam Lake—165 Sg, 165 Sh.
Palfrey Lake—1,270 Sf.
Sixth Lake—
Sixth Lake Brook—2,250 S3.
St. Croix River—
Popular Brook—1,800 S4.
Sears Brook—4,880 S2, 3,200 S3.
Upper Spednik Lake—75 Sg, 75 Sh.
Trout Brook—3,600 S4.
Saint John River—
Coac Brook—7,320 S2.
Garden Creek—7,400 S1, 3,660 S2, 3,850 S3.
Keswick River—80 Sg, 13,500 A2, 36,000 A3.
Kelley Creek—4,880 S2.
Longs Creek—4,880 S2.
Mactaquac River—14,800 S1, 6,400 S3.
N.B. Mactaquac R.—7,400 S1.
S.B. Mactaquac R.—11,100 S1.
Mazerall Brook—7,320 S2.
Nashwaaksis River—14,800 S1, 7,320 S2, 2,250 S3, 70 Sg.
Nashwaak River—211 Sg, 102 Sh, 65,000 A1, 32,400 A2, 36,000 A3.
Pokiok River—12,000 S1, 9,000 S3.
Sinite Brook—4,880 S2.
Shogomoc River—4,500 S3.
Third Lake—
Dead Brook—6,100 S2, 2,250 S3.
Bewer's Pond—1,000 S3.
Charter's Pond—1,000 S2.
Greenlaw's Pond—1,000 S3.

Victoria County—
Bay of Fundy—
Saint John River—8,977 Ag.

Speckled trout	2,011,537
Atlantic salmon	802,733
Total distribution	2,814,270

Grand Falls Fish Culture Station

Madawaska County—
St. John River—
Baker Brook—8,000 S3.
Baker Lake—20,000 S2, 8,000 S3, 5,400 Sf, 150 Sh, 25,000 G3.
Reed Brook—8,000 S2.
Coombs Brook—8,000 S2.
Daigle Brook—11,400 S2.
Dugal Brook—8,000 S2.
Foley Brook—10,000 S2.
Grand River 10,000 S2, 4,000 S3, 360 Sh.
Grew Brook—12,000 S2.
Green River—12,000 S3, 3,000 Sf.
Green Lake (Third)—13,750 G4.
Martin Brook—8,000 S1.
Thibodeau Brook—8,000 S1.
Iroquois River—12,000 S3, 150 Sh.
Belanger Brook—8,000 S1.
Blanchette Brook—7,000 S3.
Lavoie Brook—10,000 S1.
Lavesseur Brook—10,000 S2.
Little River (Grand Falls)—
DeaDwater Brook—16,000 S1, 60 Sh.
Little River (St. Francis)—10,000 S3.
Madawaska River—
Trout River—6,600 S3.
Michaud Brook—8,000 S1.
Millstream (Ledges)—10,000 S3.
Millstream (Parent)—10,000 S1.
Pelletier Brook—6,000 S3.
Caron Brook—8,000 S3, 125 Sh.
Caron Lake—24,000 S1.
Powers Brook—8,000 S1.
Quisibis River—8,000 S3.
Quisibis Lake—10,000 S1, 5,000 S3, 3,000 Sf, 240 Sh.
Rob Brook—8,000 S1.
St. Francis River—
Glazier Lake—15,560 G3.
Siegas River—10,000 S2, 300 Sh.
Clark Brook—8,000 S1.
Siegas Lake—20,000 S1.
Tedley Brook—10,000 S1.

Madawaska County (cont'd.)—

Smith Brook—8,000 S1.
Thompson Lake—20,000 S2.
Three Mile Brook—8,000 S1.
Rocky Brook—
  Unique Lake—20,000 S2, 6,000 S3, 3,000 Sf, 150 Sh.
St. John River—
  Albert Pond—10,000 Sd.
  Caron Lake—
    Pichette Lake—10,000 Sd, 10,000 S1.
  Cedar Grove Pond—5,000 Sd.
  Chapel Brook Stream—20,000 Sd.
  Coombs Brook—10,000 Sd.
  Daigle Pond—6,000 Sd.
Deadwater Brook—
  Godbout Pond—10,000 Sd.
Leforge Pond—6,000 Sd.
Madawaska River—
  Mon Repos Pond—6,000 Sd.
Siegas River—
  Siegas Pond—4,000 Sd.
Powers Creek—1,000 S2.

Restigouche County—

Little Cedar Brook—
  Range 14 Lake—6,000 S1, 5,000 S3.
N.W. Upsalquitch River—
  Chisholm Brook—20,000 S1.
Restigouche River—
  Five Fingers Brook—48,000 S1, 5,000 S3.
  Hailes Brook—41,000 S1.
  Stillwater Brook—25,000 S1.

Victoria County—

St. John River—71,000 A2, 66,800 A3.
  Baird Brook—2,000 S2.
  Bishop Brook—5,000 S2.
  Boutard Brook—12,000 S1.
  Brown Brook—3,000 S2.
  Campbell River—
    Trowser Lake—15,000 G3.
  Cochrane Brook—5,000 S2.
  Curry Brook—4,000 S2.
  Grand River—
    Big Forks Brook—12,000 S1.
    Black Brook—12,000 S1.
    Violette Brook—8,000 S1.
  Grant Brook—3,000 S2.
  Jamer Brook—3,000 S2.
  Limestone River—
    East Limestone River—6,000 S3, 191 Sf.
    Gillispie Book—2,000 S3, 150 Sf.
  Little River (Grand Falls)—15,000 S1, 6,000 S3, 3,000 Sf, 240 Sh.
    Basley Brook—10,000 S1.
    Beaverdam Brook—10,000 S1, 8,000 S3.
    McClusky Brook—5,000 S2.
    Perkins Brook—9,000 S1.
    Ryan Brook—25,000 S1, 5,000 S3, 225 Sf.
  Little River (Tilley)—20,000 S1, 7,000 S3, 120 Sh. 43,000 A 2.
  Lovely Brook—5,000 S2.
  McCarthy Brook—5,000 S1.
  Mill Brook—3,000 S1.
  Millicette Brook—5,000 S2.
  Morrell Brook—5,000 S1.
  Muniac River—5,000 S3, 300 Sf, 39,400 A2.
    Inman Brook—5,000 S2.
    Kincaide Brook—2,000 S2.
  Rapide de Femme Brook—33,500 Sd, 6,000 S3, 150 Sf.
Restigouche River—
  Jardine Brook—20,000 S1.
St. John River—
  Salmon River—18,000 S3, 2,800 Sf, 240 Sh.
  Barney Brook—10,000 S1.
  Bogan Brook—12,000 S1.
  Cedar Brook—10,000 S1.
  Club Brook—5,000 S1.
  Mooney Brook—8,000 S1.
  Outlet Brook—20,000 S1.
  Sutherland Brook—2,000 S3.
Scott Brook—3,000 S2.
Tibbitss Brook—4,000 S2.
Tobique River—300 Sh, 43,000 A2, 68,000 A3.
  Big Flat Brook—5,000 S2.
  Caldwell Brook (East)—5,000 S2, 200 Sf.
  Caldwell Brook (West)—5,000 S2, 200 Sf.
  Indian Brook—5,000 S2.
  Narrows Brook—2,000 S2.
  Odellach River—5,000 S2, 200 Sf.
  Pokiok River—5,000 S2.
  Pokiok River (L.Br.)—2,000 S2.
  Quaker River—5,000 S2.
  Three Brooks—15,000 S2.
  Trout River—10,000 S2.
Wark Brook—4,000 S2.
St. John River—
  Deadwater Brook—
    Downing Brook—5,000 Sd.
Laura Lake—6,000 Sd.
Little Salmon River—
  Back Lake—5,000 S1.
Salmon River—
  Barney Pond—10,000 Sd, 5,000 S2.
Three Brooks—
  Three Brooks tributary—4,000 S1.

Speckled trout	1,188,751
Atlantic salmon	331,200
Lake trout	69,310
Total distribution	1,589,261

Haley Brook Fish Culture Station

Carleton County—
Saint John River at
Bristol—9,540 Af.
Bath—3,180 Af.
Hartland—9,540 Af.
Woodstock—6,360 Af.

Victoria County—
Tobique River at
Browns Flats—4,770 Af.
Forks Pool—9,540 Af.
Everett—4,770 Af.
Two Brooks—4,770 Af.
Little Tobique River—14,100 A4.
Mamozekel River—14,100 A4.
Campbell River—30,000 A4.
Haley Brook—5,000 S2, 3,400 S3.
Riley Brook—6,000 S2, 3,300 S3.
Rolston Lake—6,000 S2, 2,400 S3.
Two Brooks L.H. Branch—6,000 S2.
Big Gulquac S. Branch—5,000 S2, 2,400 S3.
Blind Lake—5,000 S2.
Little Wapskeyhegan—5,000 S2.
Wapskeyhegan River—5,000 S2, 2,400 S3.
Little Cedar Brook—4,500 S3.
Wolverton Brook—4,500 S3.
Sisson Brook—5,000 S3.
Two Brooks R.H. Branch—5,000 S3.
Two Brooks L.H. Branch—3,300 S3.

Northumberland County—
Hazelton Brook—4,500 S3.
Wright Brook—4,500 S3.
Serpentine River—36,000 A2.
Mamozekel River—36,000 A2.
Serpentine River—30,000 A4.

Restigouche County—
Everett Brook—4,500 S3.
Mamozekel R.H. Branch—4,500 S3.
Little Tobique River—36,000 A2 30,000 A4.
Mamozekel River—30,000 A4.

Speckled Trout	97,200
Atlantic Salmon	308,670
Total distribution	405,870

Miramichi Fish Culture Station

Gloucester County
Tabusintac River—
Pisiguit Brook—2,000 S3, 2,400 S4.

Kent County—
Kouchibouguac Bay—
Grand Aldouane River—3,000 S3.
Kouchibouguac River—9,000 S3, 3,300 S4.
Kouchibouguasis River—9,000 S3, 3,300 S4.
Richibucto River—11,000 S3.
Bass River—3,000 S3.
St. Nicholas River—7,000 S3.
Northumberland Strait—
Buctouche River—17,600 S1, 5,000 S3.
Swallow's Pond—3,000 Sd.
Cocagne River—10,800 S1, 5,000 S3.
Saint John River—
Salmon River—128,000 A2.

Northumberland County—
Miramichi Bay—
Bartibog River—14,400 S1, 2,500 S3.
Goodfellow Brook—9,000 S1.
Green Brook—2,000 S3.
Little Bartibog River—7,200 S1.
North Brook—5,400 S1.
Bay du Vin River—10,400 S1.
Black River—12,200 S1.
Burnt Church River—8,000 S3.
Hortons Creek—4,000 S3.
Napan River—10,400 S1.
Riviere des Caches—4,000 S3.
Tabusintac River—20,000 A2, 9,350 Af, 710 Ag, 8,500 S3, 2,400 S4.
Eskedelloc River—4,500 S3.
Tracadie River—
Portage River—2,000 S3.

Miramichi River—
Northwest Miramichi River—373,600 A1, 267, 500 A2, 9,000 Af, 1,974 Ag.
Northwest Miramichi—
South Branch—
Goodwin Lake—1,800 S3.
Little River—14,000 S1.
Little Sevogle River—46,800 A1, 16,000 A2.
Little S.W. Miramichi—
River—155,200 A1, 88,000 A2.
Little S.W. Miramichi—
North Branch—19,000 A2.
South Branch—19,000 A2.
Otter Brook—1,500 S3.
Northwest Miramichi River—
Mullin Stream—6,500 S3.
Sevogle River—84,800 A1, 49,000 A2.
North Sevogle River—46,800 A1, 60,000 A2.
Peabody Lake—1,800 S3.
South Sevogle River—81,500 A2.
Tomogonops River—
Island Lake—2,400 S4.
Trout Brook—7,200 S1.
Wildcat Brook—5,400 S1.
Southwest Miramichi River—43,200 A1, 38,000 A2.
Barnaby River—93,600 A1, 27,000 S1.
Despres Lake—
(Middle Barnaby R.)—2,500 S3.
Bartholomew River—93,600 A1.
Betts Mill Brook—2,000 S3.
Big Hole Brook—2,500 S3, 2,000 S4.
Black Brook—2,000 S3.
Cains River—187,200 A1, 50,000 A2.
Donnelly Brook—7,000 S3, 2,000 S4.
Moores Brook—5,000 S3, 2,000 S4.

Miramichi Fish Culture Station—Conc.

Northumberland County (cont'd.)—
Miramichi River cont'd.—
Renous River—124,400 A1, 111-500 A2.
Dungarvon River—93,600 A1, 98,000 A2, 4,000 S3.
Dungarvon Lake—1,500 S4.
Harris Lake—1,500 S4.
North Renous River—30,800 A1.
South Renous River—
Day Brook Lake—1,500 S4.
Little South—
Renous River—
Day Lake—1,500 S4.

York County—
Southwest Miramichi River—202,800 A1, 160,000 A2.
Burnthill Brook—43,200 A1.
Burnt Land Brook—2,500 S3.
Cains River—
Bantalor Brook—2,750 S3.
McKinley Brook—2,750 S3.
North Cains River—2,500 S3.
Clearwater Brook—30,000 A1, 5,900 Af.
Rocky Brook—20,000 A2, 10,750 Af.
Brown Lake—750 S2.
Fish Lake—2,000 S2.
Sisters Brook—
Big Sister Lake—1,000 S2.
Blind Lake—750 S3.
Little Sister Lake—1,000 S2.
Long Lake—750 S2.
Round Lake—750 S2.
Taxis River—39,600 A1.

Inverness County, N.S.—
Margaree River—1,000 Ag.

Atlantic salmon	2,953,384
Speckled trout	323,400
Total distribution	3,276,784

Saint John Fish Culture Station

Albert County—
Petitcodiac River—
Little River—25,000 S1, 3,000 S3.
Prosser Brook—20,000 S1, 4,000 S3.
Turtle Creek (West)—25,000 S1.
Turtle Creek(East)—20,000 S1.
Weldon Creek—20,000 S1, 6,000 S2.
Turtle Creek—8,300 S2.
Shepody River—
Demoiselle Creek—25,000 S1, 6,000 S2.
Sawmill Creek—20,000 S1, 6,000 S2.
Bennett Lake (Fundy Park)—8,000 Sf, 108 Rk.
Chambers Lake (Fundy Park)—500 Rf, 500 Sf.
Lakeview (Fundy Park)—6,000 Sf, 108 Rk.
Laverty Lake (Fundy Park)—1,000 Sf.
Marvin Lake (Fundy Park)—500 Sf, 500 Rf.
Point Wolfe Pond (Fundy Park)—1,000 Rf.
Ayers Pond—500 S2.
Dobson Pond—500 S2.
Ford's Pond—200 S2.
McFaddens Lake—4,000 S2.

Carleton County—
Saint John River—
Bull Creek—1,500 Sg.

Kent County—
Kouchebouguac River—10,000 S3, 2,000 Sf.

Charlotte County—
Digdequash River—30,000 A1, 30,000 A3, 6,000 Af.
Alexander Brook—4,000 S2.
Anderson Brook—20,000 Sd.
Bailey Brook—10,000 S2.
Bog Brook—40,000 Sd, 8,000 S2.
Black Brook—20,000 Sd, 500 Sf.
Campbell Brook—20,000 Sd.
Craig Brook—20,000 Sd, 10,000 S2.
Dunbarton—10,000 S2.
Elmville—20,000 S2.
Falls Brook—20,000 Sd, 10,000 S2.
Jones Brook—20,000 Sd.
Little Ridge Brook—20,000 Sd.
Lower Rolling Dam—20,000 S2.
Lawrence Station—10,000 S2.
Honeydale—10,000 S2.
McGuire Brook—5,000 S2.
Mouth N.W. Branch—10,000 S2.
N.W. Branch—110,000 Sd, 10,000 S2.
Sand Point—10,000 S2.
Scott Road—10,000 S2.
Snipe Brook—4,000 S2.
Upper Rolling Dam—10,000 S2.
Wellington Brook—20,000 Sd.
Williams Brook—20,000 Sd, 10,000 S1.
Wyman Brook—10,000 S2.

Grand Manan Island—
Brandford Pond—1,760 S2.
Bluemortier Brook—200 S3.
Big Pond—800 S3.
Dwelleys Pond—1,760 S2.
Grand Brook—600 S3.
Lang Pond—800 S3.
Little Lake—1,760 S2.
Rich Pond Mill Brook—200 S3.
Stanley Brook—300 S3.
Wilson Pond—1,760 S2.
Whale Cove Pond—300 S3.

Magaguadavic River—
Clarence Stream—40,000 Sd.
Cox Brook—20,000 Sd.
Big Kenron Lake—30,000 S1.
Bernie Lake—3,000 S3.
Linton Stream—25,000 S1.

Charlotte county (cont'd.)—
Magaguadavic River—(Cont'd.)
Lake Stream—300 Sf.
LeLands Lake 5—3,000 S3.
Red Rock Lake—35,000 S1, 15,000 S3, 300 Sf.
Roix Lake—3,000 S3.
Sparks Lake—25,000 S1, 15,000 S3.
Bay of Fundy—
Chamcook Lakes—10,000 L2, 30,000 L3, 10,000 A2, 6,000 A3.
Crecey Lake—6,700 R3.
Dam Brook—500 Sf.
New River—80,000 Sd, 1,250 Sf.
New River (Little)—80,000 Sd, 375 Sf.
Pocologan River—80,000 Sd.
Sealy Brook—350 Sf.
Woodland Brook—350 Sf.
Gibson Lake—2,000 Sf.
Campabello Island—
Bay of Fundy—
Glen Severn—2,400 Sf.
Deer Island—
Little Meadow Lake—7,500 S3.
Leonards Lake—3,750 S3.
Hopper Pond—3,750 S3.
Oak Bay—
Gallop Lake—15,000 S1.
Gallop Stream—25,000 S1, 400 S.f
Meadow Brook—15,000 S1.
Porter Brook—15,000 S1.
St. Croix River—
Billy Weston Stream—200 Sf.
Bush Brook—200 Sf.
Berry Brook—30,000 Sd.
Beach Brook—20,000 S1.
Canoose River—1,700 Sf, 25,000 S1, 250 Sg.
Cranberry Brook—30,000 Sd.
Doodle Brook—20,000 Sd.
Dennis Stream—25,000 S1, 2,100 Sf.
Dickerson Brook—10,000 S1, 100 Sf.
Davis Brook—10,000 S1.
Dunham Brook—10,000 S1.
Goat Brook—600 Sf.
Goat Brook (Little)—15,000 S1.
Green Brown Brook—45,000 S1.
Goudy Brook—10,000 S1.
Haggerty Brook—10,000 S1.
Kirk Brook—15,000 S1.
Mohannis River—20,000 S1, 1,000 Sf.
McCharlies Brook—30,000 Sd.
Sandy Brook—15,000 S1.
Sawyer Brook—30,000 Sd.
Satchell Brook—10,000 S1.
Shaw Brook—10,000 S1.
Snipe Brook—20,000 Sd.
Stewart Brook—20,000 Sd.
Stevens Dam—200 Sf.
Trib. Beach Brook—10,000 S1.
Waweig Brook—60,000 Sd.
Blacks Harbour—
Gillispie Brook—200 Sf.
Oliver Meadow Brook—200 Sf.
Parks Brook—300 Sf.
Little New River—
Otter Lake—3,000 S3.
New River—
Goose Lake—6,000 S2.
Bocabec River—
Johnsons Lake—15,000 S1.
Steens Lake—15,000 S1.
Lepreaux River—
East Long & Rocky Lake—30,000 S1.
West Long Lake—4,000 S2.
Shaws Lake—25,000 S1.
Knights Pond—25,000 S1.
Otter Lake—2,000 S2.
S.B. Oromocto Lake—5,000 S2.
Lake Utopia—
Jerry Pond—25,000 S1.
Spear Brook—40,000 Sd, 1,000 Sf.

Kings County—
Kennebecasis River—
Arnold Hollow Brook—10,000 Sc.
Barnsville Brook—20,000 Sd.
Cassidy Lake—40,000 S1, 1,500 Sf, 400 Sh.
Chestnut Brook—20,000 Sc, 7,000 S2.
Cedar Camp Brook—20,000 Sc, 10,000 Sd.
Dee Brook—15,000 S1, 7,000 S2.
Drury Cove Brook—15,000 S1, 7,000 S2.
Foley Brook—15,000 S1, 7,000 S2.
Harry Brook—10,000 S1, 7,000 S2.
Hammond River—60,000 Sd.
Knapp Lake—1,000 S3.
Kennebecasis River—150 Sg, 850 Sf.
MacLeod Brook—30,000 Sc, 20,000 Sd, 7,000 S2.
MacGreggor Brook—20,000 Sc, 7,000 S2.
Mill Pond Brook—40,000 Sc.
Mill Brook—30,000 Sc.
Millstream—25,000 S1, 14,000 S2.
Moosehorn Creek—20,000 S1.
Mitchell Brook—20,000 S1.
MacKeever Brook—3,000 S2.
Mud Lake—150 Sg.
Pickwaket Brook—15,000 S1.
Sally Brook—15,000 S1, 7,000 S2.
Smith Creek—10,000 Sc, 15,000 S1, 14,000 S2, 300 Sf, 150 Sg.
Stone Brook—7,000 S2.
S.B. Kennebecasis River—300 Sf.
Trout Creek—20,000 Sc, 150 Sg, 300 Sf.
Wards Creek—40,000 Sc, 250 Sf.
Windgap Brook—15,000 S1, 7,000 S2.
Saint John River—
Bellisle Creek—25,000 S1.
Corcoran Lake—2,000 S3.
Elm Flat Brook—30,000 Sc.
Grant Brook—30,000 Sc.
Kingston Lake—1,000 S3.
Jolife Brook—10,000 S1.
Jenkins Lake—2,000 S3.
Morgan Lake—500 Sf, 400 Sg, 150 Sh.
Nices Lake—2,000 S3.
Oromocto Lake (Big)—500 Sf, 300 Sg.
Pickett Lake—2,000 S3.
Pickett Brook—1,000 S3.
Walton Lake—1,000 S3.

Kings County (cont'd.)—
- Petitcodiac River—
  - Anagance River—10,000 S1.
  - Blakney Brook—10,000 S1.
  - Gordon Brook—5,000 S1.
  - Cameron & Bennett Brook—30,000 S1.
  - Hayward Brook—20,000 S1.
  - Holmes Brook—20,000 S1.
  - North River—50,000 S1.
  - Mechanic Lake—1,000 Sf.
  - Morney Brook—10,000 S1.
  - Price Brook—2,500 S3, 1,500 Sf.
- Bay of Fundy—
  - Little Salmon River—30,000 Sd.
  - Chocolate Brook—20,000 Sc.
- Kennebecasis River—10,000 A2, 32,000 A3.
  - Kennebecasis (headwaters) 6,000 Af.
  - Dreaury Cove—20,000 A1.
  - Hammond River—20,000 A1, 1,470 Ag, 16,000 Af.
  - Mitchell Brook—20,000 A1.
  - Moosehorn Brook—20,000 A1.
  - Millstream—20,000 A1.
  - Trout Creek—20,000 A1.
  - Wards Creek—20,000 A1.
- Cooks Pond—300 S2.
- Dickson Pond—1,000 S2.
- Harvey Lake—500 S2.
- Kennebecasis (Park Pond)—1,000 S2.
  - Moss Glen & Wentmore Lakes—10,000 S2.

Queens County
- Grand Lake—
  - Big Forks—60,000 Sd, 10,000 S2, 900 Sf.
  - Castaway Brook—30,000 Sd, 5,000 S2.
  - Cumberland Bay Creek—20,000 Sd, 20,000 A1, 600 Sf.
  - Gaspereaux Forks—80,000 Sd.
  - Friel Brook—10,000 Sd, 2,000 S2.
  - Gaspereaux River—10,000 A1, 200 Sf, 300 Sg.
  - Gray Brook—2,000 S2.
  - Little Forks—20,000 Sd, 10,000 S2.
  - Mill Brook—10,000 A1.
  - North Forks—20,000 Sd.
  - Newcastle Creek—10,000 A1, 750 Sf, 300 Sg.
  - N.B. Salmon River—10,000 A1.
  - Salmon Creek—30,000 Sd, 10,000 A1.
  - Salmon River 30,000 Sd, 10,000 A1, 750 Sf, 300 Sg.
  - Youngs Cove Stream—20,000 Sd, 5,000 S2.
- McKeel Lake—17,500 S1.
  - Trout Lake—20,000 S2.
  - Cranberry Lake—4,000 S2.
  - Camp Gagetown Area—142,000 S2.
  - Ferris Brook—3,500 S3.
  - Half Moon Lake—4,000 S2.
  - Nerepis River—3,500 S3.
  - Otnebog River—7,000 S3.
- MacDonald Pond—300 S2.

Saint John County—
- Kennebecasis River—
  - Adams Lake—40,000 Sd, 10,000 S1, 3,000 S3, 500 Sf.
  - Dolans Lake—40,000 Sd, 10,000 S1, 3,000 S3, 1,000 Sf.
  - Germain Brook—50,000 Sd, 1,000 S4.
  - Hanford Brook—100,000 Sd, 1,000 S4.
  - Henry Lake—50,000 Sd, 1,000 S4.
  - McCormac Lake—25,000 S1, 3,000 S3, 500 Sf.
- Mispec Stream—
  - Brandy Brook—20,000 S1, 1,000 Sf.
  - Grassy Lake—30,000 S1.
  - Loch Lomond Lake—60,000 Sd, 10,000 S2, 15,000 S3, 1,000 Sf, 300 Sg, 558 Sh.
  - Second Loch Lomond Lake—60,000 Sd, 10,000 S2, 5,000 S3.
  - Third Loch Lomond Lake—10,000 S2, 5,000 S3.
  - McCracken Lake—60,000 Sd, 20,000 S1, 3,000 S3, 800 Sf.
  - Mispec Stream—30,000 Sd, 15,000 S1, 485 Sf.
  - Taylor Lake—40,000 Sd, 1,800 Sf.
  - Terrio Lake—20,000 S1, 500 Sf.
  - Wilmot Brook—60,000 Sd, 10,000 S2.
- Little River—
  - Blackhall Lake—25,000 S1.
  - Cherry Lake—4,000 S2.
  - Boaz Lake—4,000 S2.
  - Douglas Lake—30,000 Sd, 2,500 S2, 362 Bg.
  - Eldersey Brook—20,000 Sd, 2,500 S2.
  - Graham Lake—30,000 S1.
  - Treadwell Lake—30,000 Sd, 300 Sf, 500 Sg, 388 Sh.
- Bay of Fundy—
  - Black River—45,000 S1.
  - East Musquash—1,500 Sf.
  - East Black River—30,000 S1.
  - Hanson Brook—40,000 Sd, 875 Sf.
  - Little River—50,000 S1, 1,150 Sg.
  - Logfalls Dam—2,500 Sf.
  - Milligan Lake—50,000 S1, 3,000 S3.
  - Sadler Lake—3,000 S3.
- Big Salmon River—
  - Four Mile Lake—30,000 S1.
  - Pats Lake—30,000 S1.
  - Rody Lake—30,000 S1.
  - Tafts Lake—30,000 S1.
  - Mary Pitcher Lake—6,000 S2.
- Saint John River—
  - Back Dam—3,000 S3.
  - Mayflower Lake—2,000 S3, 750 Sf.
  - Crescent Lake—750 Sf.
  - Mary Ann Hole—3,000 S3, 1,000 Sf.
  - Blindmans Lake—300 Sf, 150 Sh.
- Courtenay Bay—
  - Lily Lake—1,000 Sf, 225 Sg, 25 Sh.
- Musquash River—
  - Queens Lake—20,000 S2.
  - Clear Lake—10,000 S2.
  - Round Lake—10,000 S2.
- Big Salmon River—9,997 Ag, 29,652 Af, 30,000 A1.
- Black River—13,000 A3, 10,000 A2, 42,000 A3.
- Ashburn Lake—10,000 S2.
- Alward Lake—200 S2.
- Balls Lake—7,000 S2.

Saint John Fish Culture Station—Conc.

Saint John County (cont'd.)—
Limestone Lake—25,000 S1.
Mistake Lake—1,000 S2.
MacDonald Lake—2,000 S2.
Minote and Cosy-Cosy Lake—2,000 S2.

Sunbury County—
Oromocto River—
Big Morance Brook—35,000 S1.
Boone Brook—30,000 S1.
Dan Brook—60,000 S1.
Hardwood Brook—35,000 S1.
Little Morance Brook—30,000 S1.
Little Yoho Brook—49,000 S1.
Lyons Stream—35,000 S1.
Mill Brook—20,000 S1.
Monday Brook—30,000 S1.
Naisson Brook—14,000 S1.
Otter Brook—42,000 S1.
Peltoma Lake—45,000 S1.
Peltoma Stream—45,000 S1.
Pete Brook—20,000 S1.
Porcupine Brook—35,000 S1.
Scribner Brook—30,000 S1.
Shin Creek—30,000 S1.
Three Tree Creek—21,000 S1.
Yoho Lake—100,000 S1.
Saint John River—
Big Oromocto Lake—1,050 Sf, 300 Sg.
Gardeners Creek—50,000 S1.
Magaguadavic River—
Piskahegan River—30,000 S1.
French Lake—
Little River—16,000 S2.

Westmorland County—
Northumberland Strait—
Abougagin River—25,000 S1, 1,400 Sf.
Scoudouc River—15,000 S1, 1,400 Sf.
Shediac River—40,000 S1, 1,200 Sf.
Petitcodiac River— 2RK
Anagance River—1,000 S3.
Cameron Brook—3,000 S2, 2,500 S3.
Chapman Brook—15,000 S1, 1,000 S3.
Coal Brook—20,000 Sd.
Hayward Brook—2,000 S2, 3,000 S3.
Holmes Brook—2,000 S2, 2,000 S3.
Keith Brook—20,000 Sd.
Killam Brook—10,000 S1, 1,000 S3.
McMachin—40,000 Sd.
Mullins Brook—30,000 Sd.
North River—9,200 S2, 5,000 S3.
Price Brook—40,000 Sd.
South Branch—20,000 Sd.
Springhill Brook—30,000 Sd.
Havelock Cement Pond—5,000 S2.
Stone's Pond—500 S2.

York County—
Magaguadavic River—
Davis Brook—20,000 S1, 5,000 S3.
Deadwater Brook—20,000 S1.
Frog Lake—5,000 S3.
Harvey Lake—5,000 S3, 35,000 A1.
Kendron Lake (Little)—35,000 S1.
Second Lake—790 Sf.
McAdam Reservoir—308 Sf, 75 Sg, 25 Sh.
Magaguadavic River—35,000 A1.
N.E. Magaguadavic River—25,000 S1, 5,000 S3.
Oliver Brook—20,000 S1, 5,000 S3.
Oromocto Lake—10,000 S3, 35,000 A1.
Stoney Brook—20,000 S1.
Trout Brook (Upper)—20,000 S1. 5,000 S3.
Trout Brook (Lower)—20,000 S1.
White Beaver Brook—20,000 S1.
Saint Croix River—
Trout Brook—10,000 S1.
Seats Brook—10,000 S1.

Speckled Trout (all groups)	6,412,869
Atlantic Salmon	607,119
Brown Trout	362
Rainbow Trout	8,918
Sebago Salmon (Landlocked)	40,000
Total distribution	7,069,268

PRINCE EDWARD ISLAND

Cardigan Fish Culture Station

Kings County—
Bear River—2,100 S3.
Big Pond—3,000 S4.
Black Pond—3,000 S4.
Boughton River—2,100 S3.
Ross' Pond—3,500 S3.
Whitlock's Pond—4,200 S3.
Brudenell River—
Jackson's Stream—1,600 S4.
Mellish's Pond—3,000 S4.
Munn's Pond—1,000 Sf.
Cardigan River—1,600 S4, 1,047 Sf, 1,000 R3.
Easton's Pond—2,100 S4.
Lavandier's Pond—2,100 S4.
Lewis Pond—1,400 S4.
Cherry Hill Stream—3,500 S4.
East Lake—3,000 S4.
Fitzpatrick's Pond—1,000 Sf, 192 Sg.
Fortune River—20,000 A2.
Big Brook—1,000 Sf.
Greek River—6,000 S1.
Finlayson's Pond—4,200 S4.
Hay River—2,100 S3.
Lakeside Pond—5,000 R3.
McCarnie's Pond—6,000 S1.
MacGinnis Pond—3,000 S4.
MacLure's Pond—3,000 S4.
Midgell River—3,500 S3, 54,000 A2, 4,000 Af.
MacDonald's Pond—1,000 Sf.
MacKinnon's Stream—2,800 S3.

Kings County (cont'd.)—
- Mitchell River—
  - MacKenzie's Pond—1,000 Sf.
- Montague River—5,250 S3.
  - Annear's Pond—2,800 S4.
  - Brown's Creek—
    - MacKinnon's Pond—3,000 S4.
  - Knox's Pond—2,800 S3.
  - Geo. MacDonald's Pond—1,400 S3.
  - MacPherson's Pond—3,000 S4.
- Morell River—6,000 S4, 54,000 A2, 10,000 Af.
  - Crane's Stream—3,000 S4.
  - Leard's Pond—3,000 S4.
  - MacAulay's Pond—2,800 S4.
  - Mooney's Pond—2,800 S4.
- Morrison's Brook—
  - Morrison's Pond—2,500 S4.
- Murray Harbour—
  - Fox River—4,200 S4.
  - Lorne Stewart Pond—3,000 S4.
- Naufrage River—3,150 S3.
  - Larkin's Pond—5,250 S3.
- North Lake—20,000 A2.
  - Dickson's Pond—3,000 S4.
- Pine Brook—1,750 S3.
- Priest Pond—2,250 S4.
- St. Peters Lake—4,000 S4.
- Schooner Pond—3,500 S3.
- Strickland's Pond—1,000 Sf.
- Sturgeon River—8,000 S1.
  - Moore's Pond—4,200 S4.
- Town Pond—750 S4.

Prince County—
- Auld's Brook—2,250 S3.
- Black Pond—1,000 Sf.
- Conroy's Pond—2,250 S4.
- Clark's Pond (Wilmot)—2,000 Sf.
- Clark's Stream—1,400 S4.
- Davidson's Pond—1,000 Sf.
- Dunk River—4,200 S3, 6,270 R3.
  - Calbeck's Pond—4,200 S4.
  - Scales' Pond—4,200 S4, 6,270 R3.
  - Wigmore's Pond—3,000 S3.
  - Wright's Pond—4,200 S3.
- Egmont Bay—
  - Enmore River—3,000 S4.
  - Pierre Jacques River—4,500 S3.
  - Sheep River—3,000 S3.
- Foxley River—4,375 S3.
- Gordon's Pond—3,750 S4, 693 Sf.
- Greenan's Stream—2,250 S3.
- Hunter's Pond—1,000 Sf.
- Ira Banks Pond—1,875 S3.
- Little Miminegash Pond—
  - Kelly's Stream—2,600 S3.
  - Luttral Stream—2,200 S3.
  - Myer's Stream—3,500 S3.
- Lockerby's Pond—2,250 S3.
- MacLellan's Stream—2,100 S4.
- McNally's Pond—3,000 S3.
- Mill River—
  - Bell's Stream—3,000 S4.
  - Gard's Stream—2,200 S3.
  - Richard's Pond—3,150 S3.
- Nail Pond—1,000 Sf.
- Perry's Pond—3,000 S3.
- Round Pond—3,000 S4.
- Shea's Pond—1,000 Sf.
- Tignish River—24,000 A2.
  - Harper's Stream—5,600 S4.
  - Little Tignish River—2,800 S4.
- Trout River (Lot 10)—2,600 S4.
  - Leard's Pond—3,500 S4.
- Trout River (Tyne Valley)—1,250 S3.
- Tryon River—
  - Ives Pond—1,500 S4.
  - Lord's Pond—1,500 S4.
- Warren's Pond—2,250 S3.
- Wilmot River—4,900 S4.

Queens County—
- Aberdeen Lake—1,500 S4.
- Brander's Pond—1,500 S3.
- Buell's Pond—2,250 S4.
- Campbell's Pond (Park Corner)—3,000 S3.
- Cousin's Pond—2,250 S3.
- Dalvay Lake—5,000 R3.
- Dixon's Stream—3,000 S4.
- East River—1,400 S4.
- Flat River—
  - MacPherson's Pond—1,000 Sf.
- Gates Pond—3,000 S4.
- Gillis Pond—5,000 Sd.
- Glenfinnan Lake—13,200 R3.
- Glenfinnan River—3,500 S3.
- Gurney's Stream—3,000 S3.
- Hope River—2,500 S4.
- Hunter River—
  - Bagnall's Pond (Rae)—4,500 S3.
  - Campbell's Pond—45,00 S4.
- Johnston River—3,500 S3.
  - Brazil Pond—3,500 S3.
- Jones Pond—2,800 S4.
- Kelly's Pond—2,100 S4.
- Long Pond—5,000 R3.
- McGee Pond—750 Sf.
- Morrison's Pond—2,100 S4.
- Orwell River—2,250 S4.
- Paynter Pond—3,750 S3.
- Parson's Pond—2,800 S4.
- Pinette River—
  - MacPherson's Pond—1,000 Sf.
  - Ross Pond—150 Sg.
  - Twin Pond—3,750 S4.
- Rackham's Pond—4,500 S3.
- Stanley River—
  - Coles Pond—2,800 S4, 700 Sf.
  - Howett's Pond—2,800 S4.
- Tracadie Bay—
  - MacAulay's Stream—3,000 S3.
  - Winter River—3,000 S3.
- Vernon River—
  - Lane's Brook—1,500 S4.
  - MacLean's *or* Ross Pond—3,750 S4.
  - MacMillan's Pond—1,000 Sf.
- Warren's Pond—1,000 Sf.
- West River—4,900 S3.
  - Brookvale Stream—4,500 S4.
  - Carragher's Pond—3,500 S3.
  - Clyde River—3,000 S4.
  - Crosby's Pond—1,000 Sf.

Cardigan Fish Culture Station—Conc.

Queens County (cont'd.)—
Westmoreland River—
Ferguson's Pond—3,000 S4.
Leard's Pond—3,000 S4.
MacDonald's Pond—1,000 Sf.
Wisner's Pond—2,000 S2, 1,500 Sf.

Atlantic salmon	186,000
Rainbow trout	41,740
Speckled trout	389,282
Total distribution	617,022